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ABSTRACT

Although education and training should be a source of relative advantage for Australia, the competitive benefits expected from the nation's "clever country" strategy have been slow to emerge. When 22 countries including Australia, Germany, Singapore, the United Kingdom, United States, and New Zealand were compared from the standpoint of 8 factors contributing to national competitiveness, 17 countries were deemed more competitive than Australia. Three factors (infrastructure, government, and people) were identified as likely drivers of Australian competitiveness, and three others (internationalization, domestic economic strength, and science and technology) were identified as likely restraints on competitiveness. The following strategies for improving the competitiveness of Australian work skills were proposed: match qualification growth of key competitors; develop an integrated qualification framework that can be applied to post-compulsory schooling and vocational programs; address Australia's post-compulsory profile gap and profile age gap; improve the alignment of education and training and industry work skill priorities; and use ongoing benchmarking and evaluation processes to implement effective continuous improvement strategies for education and training. (Thirty-one tables/figures are included. Appended are the following: comment on the development of comparative qualification frameworks; alternative Australian qualification measures; and procedures for measuring the relationship between qualification stocks and national competitiveness.) (MN)

ED 420 786

REPORT NO. 2: BENCHMARKING AUSTRALIAN QUALIFICATION PROFILES

WORKSKILLS AND NATIONAL COMPETITIVENESS: EXTERNAL BENCHMARKS

AUSTRALIAN NATIONAL TRAINING AUTHORITY

By R. B. Cullen

A Project conducted by Performance Management Solutions for the Australian National Training Authority

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PART I: SUMMARY i-xiv

PART II: REPORT

SECTION ONE:	INTRODUCTION	1
SECTION TWO:	THE CHALLENGE OF NATIONAL COMPETITIVENESS	6
SECTION THREE:	QUALIFICATION PROFILES AND NATIONAL COMPETITIVENESS	15
SECTION FOUR:	FUTURE QUALIFICATION GROWTH	32
SECTION FIVE:	COMPARING THE PERFORMANCE OF EDUCATION AND TRAINING REFORM IN SELECTED BENCHMARK COUNTRIES	45
SECTION SIX:	IMPROVING THE COMPETITIVENESS OF AUSTRALIAN WORKSKILLS	57

PART III: APPENDICES

Appendix A:	A Comment on the Development of Comparative Qualification Frameworks	65
Appendix B:	Adjusted OECD Profile Measures for Australia, 1991 and 1994	68
Appendix C:	Measuring the Relationship Between Qualification Stocks and National Competitiveness	72

PART 1: SUMMARY

Introduction

Education and training should be a source of relative advantage for Australia. The nation started the decade with relatively high stocks of qualified persons and moved early to reform national and state-based education and training systems. However, the competitive benefits expected from the "clever country" strategy have been slow to emerge. Australian competitiveness actually declined between 1994 and 1997.

This Report examines the links between national competitiveness and workskills, as measured by the stocks of education and training qualifications across 22 OECD countries and, in more detail, between Australia and five selected benchmark countries (U.S., Singapore, Germany, New Zealand, U.K.)

The analysis identifies three issues which education and training changes in Australia need to address.

- First, when Australian qualification stocks are compared with those of other OECD countries, there is an imbalance between Australia's ranking on degrees (5-7) and the ranking for all post-compulsory qualifications (15). This imbalance seems likely to restrain attempts to improve national competitiveness, unless the imbalance is corrected by maintaining the competitiveness of the degree ranking while also increasing the post-compulsory ranking.

- Second, an analysis of future profile growth across all OECD countries suggests that other countries are growing faster than Australia. Unless growth is accelerated, particularly at the 'Year 12' and 'skilled vocational' level of qualifications, Australia's ranking is likely to weaken further.

- Third, the failure to match the qualification profile growth of key competitors is partly explained by the relatively high level of education and training resources required to maintain Australia's existing qualification stocks as a proportion of the growing overall population.

National Competitiveness

Competitiveness can be defined as the ability of a country to generate proportionately more wealth than its competitors in world markets. Governments in most countries, when facilitating the expansion in education and training, expect to gain competitive value from enhanced workskills. However, competitiveness is a relative concept. To obtain competitive benefits from education and training reform in an increasingly global world, a country needs to perform better than its competitors.

Each year IMD analyses the competitiveness of 46 countries and produces The World Competitiveness Yearbook which is a useful source of data for international benchmarking. The 1997 edition estimates that Australian competitiveness has increased over 1996 but remains below the competitiveness ranking achieved in 1994, and that the only competitiveness factors to become more competitive since 1994 are the 'people' and 'management' factors.

These data suggest that to reverse declining competitiveness, Australia needs to address restraint factors while maintaining 'people' competitiveness and ensuring that the processes which convert 'people' strengths into 'national competitiveness' reflect world best practice.

The World Competitiveness Yearbook identifies eight factors which contribute to national competitiveness. Three points are drawn from an analysis of data.

- The 1997 national competitiveness ranking identifies 17 countries as being more competitive than Australia. They include all of the five benchmark countries addressed in detail in this Report (U.S., Singapore, Germany, New Zealand, and the U.K.)

- To identify factors likely to 'drive' or 'restrain' improvements in national competitiveness in each benchmark country, factor rankings are compared with the overall competitiveness ranking. For Australia, the likely drivers are identified as 'infrastructure', 'government', and 'people' and the likely restraints as 'internationalization', 'domestic economic strength' and 'science and technology'.

- Transition analysis suggests that only two factors, 'people' and 'management' have become more competitive over the period 1994-1996. Reduction in Australia's relative performance of the 'internationalization' and 'science and technology' factors presents problems for national performance and challenges for education and training reform. The rapid decline in the relative performance of the 'science and technology' factor, from a driver to a restraint, may indicate a new threat to national competitiveness.

Qualification Profiles and National Competitiveness

An analysis of the OECD qualification profiles against The World Competitiveness Yearbook 1997 competitiveness rankings suggests that at least half the variations in competitiveness between countries in 1997 can be explained in terms of differences between qualification profiles. The most significant qualification profile for explaining differences in competitiveness between OECD countries is 'all post-compulsory' qualifications. This measure includes the final year of high school, major vocational qualification streams such as apprenticeships, and both sub-degree and degree level post-secondary qualifications.

The relationship appears to be hierarchical, differentiating between countries first on the basis of all post-compulsory qualifications, then on the basis of all post-secondary qualifications, and finally on the basis of degree level qualifications.

This analysis has important implications for education and training reform in Australia.

- Although Australia ranks 5 for degrees and 11 for post-secondary, its ranking for 'all post-compulsory' qualifications reduces to 15.[1]

- The most significant qualification profile for explaining differences in competitiveness

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[1]These rankings for Australia use profile data adjusted in this Report. Rankings on published OECD profiles for Australia are 7 for degrees, 5 for post-secondary, and 15 for post-compulsory.

between OECD countries is 'all post-compulsory' qualifications. This suggests that countries which expand university and other higher level post-secondary qualifications without expanding the post-compulsory school and equivalent VET programs at the lower end of the profile will prove to be less competitive than countries that achieve a balanced expansion. In Australia, the non post-secondary part of the post-compulsory profile is delivered by schools and the VET system. Schools includes those completing Year 12. VET includes all skilled vocational programs, including apprenticeships and equivalent programs.

- The imbalance in the Australian qualification rankings suggests that the competitive position delivered to Australia by its degree level ranking may be offset by the failure to achieve a more competitive post-compulsory ranking. Three strategies are suggested to remove this restraint: first, to increase the efficiency of the workskill development process by strengthening industry/enterprise - based training; second, to target qualifications which will increase the relevance of qualifications to the future needs of key industries; and third, to expand the long-term supply of qualifications into the Australian workforce at the post-compulsory level.

- One priority for education and training reform needs to be to audit this gap at the post-compulsory level against the standards delivered by other countries, and to develop programs to improve Australia's national ranking at the post-compulsory level. In seeking to expand its post-compulsory qualifications and increase its ranking, Australia needs to expand vocational programs which meet the International Standard Classification of Education (ISCED) Level 3 standard, as well as addressing the needs of adults who have entered the workforce with lower level qualifications to upgrade those qualifications where they can add to industry performance.

Future Competitiveness

To ensure future competitiveness, Australia's qualification profile must grow at least as rapidly as that of its competitors. Yet over the period 1991 - 1994 Australian qualification profiles grew less rapidly than the OECD average. With the possible exception of the degree profile, this analysis suggests that:

- over the period 1991 - 1994, Australian profile growth lagged behind that of comparable countries; and,

- unless action is taken to correct current trends, the situation is likely to deteriorate in the future.

Profile growth alone will not necessarily improve a country's qualification profile ranking. While Australian profiles appear to have increased between 1991 and 1994, the profile for Australia grew less rapidly than the average profile for OECD benchmark countries. An analysis of the Qualification Profile Age Gaps between younger and older persons suggests that Australia's post-compulsory and post-secondary profile growth is likely to continue to lag behind that of competitors.

The relationship between qualification profile rankings, particularly between post-compulsory rankings and competitiveness, discussed above, suggests that, unless priorities focus on the post-compulsory levels (including School Year 12, apprenticeships and equivalent level

vocational qualifications), the low ranking of the post-compulsory profile and the low relative growth are likely to continue to restrain competitiveness and to offset the strengths delivered by Australia's reform of higher level qualifications.

When Australian data are corrected to enable a comparison between 1991 and 1994, the growth is clearly lower than the OECD average, with the possible exception of the degree profile.

- The post-compulsory Profile Age Gap, the gap between the post-compulsory profile of the Age 25-34 population and the Age 25-64 population in Australia in 1994, was 4.1%. The comparable gap for other OECD countries was 11.5%, which suggests that Australia's already low ranking will come under further threat.

- The gap between the post-secondary profile of the Age 25-34 population and the Age 25-64 population in Australia in 1994 was 0.6%. The comparable gap for other OECD countries was 2.1%, which suggests that Australia's relatively higher ranking for this profile may be eroded.

- The gap between the degree profile of the Age 25-34 population and the Age 25-64 population in Australia in 1994 was 1.4%. The comparable gap for other OECD countries was 1.1%, which suggests that Australia's relatively higher ranking for this profile can be sustained if current levels of degree outputs relative to the workforce can be maintained.

Between 1990 and 2010 the Age 25-34 population in Germany is forecast to decline by 33.6% compared with a decline in Australia of only 1.8%. Analysis of population shifts and resources available for education and training demonstrates that profile growth is likely to be more restrained by resources in Australia than in the other benchmark countries. Although this analysis of future growth addresses only the relative levels of resources required to maintain existing profiles, the analysis has clear implications for both education and training strategies and competitiveness strategies in Australia.

- While resource restraints may appear to ease when the school leaver cohort reduces in numbers, the effect in Australia may prove to be an illusion. Other countries appear to be using surplus resources created by population reductions to train more of their young people to ISCED Level 3, and some are also addressing the skill gaps of those already in the workforce.

- These resource pressures suggest that options which diversify the resourcing of education and training at all levels of the Australian economy need to be actively pursued.

- Issues of profile balance and of targeting priorities to optimise the links with competitiveness are likely to become more critical in Australia than in a number of the other benchmark countries.

- The growing numbers of younger trained persons can also be a major source of comparative advantage, providing: that the mix of skills is competitive; that a strong basis for future learning is part of the core skills delivered; and that, where the growing Profile Age Gap is also a skills gap, Australia manages it successfully.

Comparing the Performance of Education and Training reform in Selected Benchmark Countries

To maintain its competitive position, a country's education and training priorities need to keep pace with global change. To create a source of national competitive advantage, education and training reform needs to benchmark specific country differences and to find ways to implement reform faster and more effectively than its competitors.

Workskills provide a focus for managing the changing linkages between education and training and the competitiveness of industries, and they can be used to identify three changes which education and training reform must address.

- The move to mass post-secondary education and training is dramatically altering the way in which students see and employers use qualifications.

- The dynamic nature of workskill formation means that the trend to upgrade the skills of the existing workforce will continue, and that countries which perform this upgrading most effectively will gain a major workskill advantage over those which remain focused on entry qualifications.

- While the cycle time between the identification of a performance challenge in industry and the implementation of an effective response has reduced, the cycle time between the identification of education and training priorities and the delivery of new skills into the workforce has tended to increase. This cycle time mismatch must be bridged as part of effective education and training reform.

A comparison of education and training reforms in benchmark countries identifies major differences in approach, which are likely to impact on both the cost-effectiveness of education and training and on the capacity to translate education and training outcomes into national competitiveness. Each of the five countries included in this analysis can be used to benchmark a different aspect of education and training reform.

- The U.S. system provides the benchmark for federal deregulation. The U.S. system is often criticised for the wise range of standards it allows. But it is an example of market-driven system. Qualifications differ, and students and employers know it. Market forces and student choice operate to shorten cycle time and to ensure that, alongside obvious quality troughs, the U.S. system has more than its share of quality peaks.

- The Singapore reforms provide the benchmark for linking education and training reform to national competitiveness through workskill planning. While the area of planning focused on outcomes, rather than on systems or resources is difficult for many in education to comprehend, the results achieved by Singapore cannot be discarded because it is a small country. It is also highly successful.

- The New Zealand reforms provide a benchmark for combining simpler and better integrated central planning and funding systems with devolution, a more flexible labour market, and the development of a more diversified funding base.

- The U.K. system and perhaps the New Zealand system provide benchmarks for combining education and training reform with labour market deregulation to create added value for students and industry. Although many deplore the resultant employment conditions, such strategies seem to deliver employment and to operate to reward those who can add value to the performance of particular enterprises.

- The German system provides a benchmark for post-compulsory vocational qualifications. Whether current rigidities in the German system are a function of short-term stresses generated by change and unification, and whether reforms to the dual system can address the need to shorten response times, are questions which will be resolved over then next few years. The latest reforms address the need for a more flexible and cost-effective (to employers and students) system of vocational training. The wide acceptance in Germany of the current system as a major pathway into the world of work means that new developments in the German training system to address current problems are likely to provide useful ideas for other systems. The lack of university reform in Germany seems to be a threat to that system. This analysis suggests that future competitiveness pay-offs for a country like Germany may come from differentiation between competitors on the basis of higher level qualification profiles. If this is correct, changes to the university system to deliver cost-effective skills to business and pressures created by a growing degree stock will need to be addressed by the 'dual' system.

Improving the Competitiveness of Australian Workskills

By most measures, workskills in Australia have increased in recent years. However, these improvements have not be translated into a general improvement in national competitiveness. It is important to explore why competitiveness has not increased. What can Australia learn from the successes of other countries? Have other factors offset improvements in workskills? Has the process produced the wrong mix of workskills for the future needs of different industries? Has Australian management met the challenge of translating new workskills proactively into added competitive value for particular industries?

If Australia is to gain from external benchmarking, the process needs to focus both on the volume, quality and relevance of outcomes and on the processes used to align the priorities of the education and training system with industries' priorities and with improvements in national competitiveness.

Australia faces clear national priorities and a limited national resource base. Benchmarking needs to ask whether there are more effective strategies for addressing outcomes than the traditional planning, funding and evaluation systems that evolved to meet different needs. The most effective way to address these issues is to move beyond the internal competition for status and resources which drives so much of the education and training debate, by examining in detail solutions utilised by other countries who are more competitive than Australia. The most effective way to assist the education and training system to align priorities is to deregulate and decentralise the education and training system, to diversify funding sources, and to shorten cycle times.

Australia needs to re-engineer the value chain which creates the national skill base: to shorten cycle time; to increase the focus on external competitiveness; to enhance links between

industries and the education and training system: and to establish the preconditions for successful programs of continuous improvement at all levels of the education and training system.

Five improvement strategies are suggested.

Match the future qualification growth of key competitors

- Maintain growth to match competitors with more rapidly ageing populations and lower population growth.

Develop an integrated qualification framework for Australia which can be applied to post-compulsory schooling programs, as well as to vocational programs

- Review Australian qualification standards, first, to ensure that they are compatible with international as well as national standards, and second, to ensure that they emphasise competitiveness and workskill links, as well as traditional supply-side sector and institutional links.

- Align Australian standards with evolving international standards and with developing VET, school and university standards.

Address two key strategic gaps between Australia and major competitors: the post-compulsory profile gap and the Profile Age Gap.

- Ensure that future qualifications growth addresses the growing gap at the post-compulsory end of the profile. This requires a mix of school and VET pathways which leads to higher level base qualifications than many young Australians appear to be gaining today.

- Review post-compulsory programs offered by the VET and school systems, to evaluate them against the ISCED Level 3 standard, and to ensure that they offer a sound basis in the three core areas of workvalue: ideas and concepts; operationalization of skills in the workplace; and the capacity for future learning. For some school programs, the operationalization test will present a challenge. For some of the very modular VET programs, the provision of a general skill base to support ongoing learning will also prove challenging. However, both the school and VET systems in Australia have addressed these issues in recent years. It is now important to assess what has been delivered.

- Examine strategies utilised by other countries to upgrade and reskill the existing workforce, and benchmark improvement strategies for Australia, to ensure that Australian education and training outcomes are competitive in this area of reform.

Improve the alignment of education and training and industry workskill priorities

- Examine strategies utilised by other countries and industries to translate education and training reform into industry competitiveness, and identify and benchmark improvement strategies for Australia. Where necessary, re-engineer the education

and training value chain to increase both flexibility and scope to add value to the national skill base.

Use ongoing benchmarking and evaluation processes to implement effective continuous improvement strategies for education and training

- Establish Benchmarking Teams with representatives from education and training and industries to evaluate annually trends in Australian qualification profiles and national competitiveness against trends in benchmark countries, and require Teams to report annually on required strategic actions.

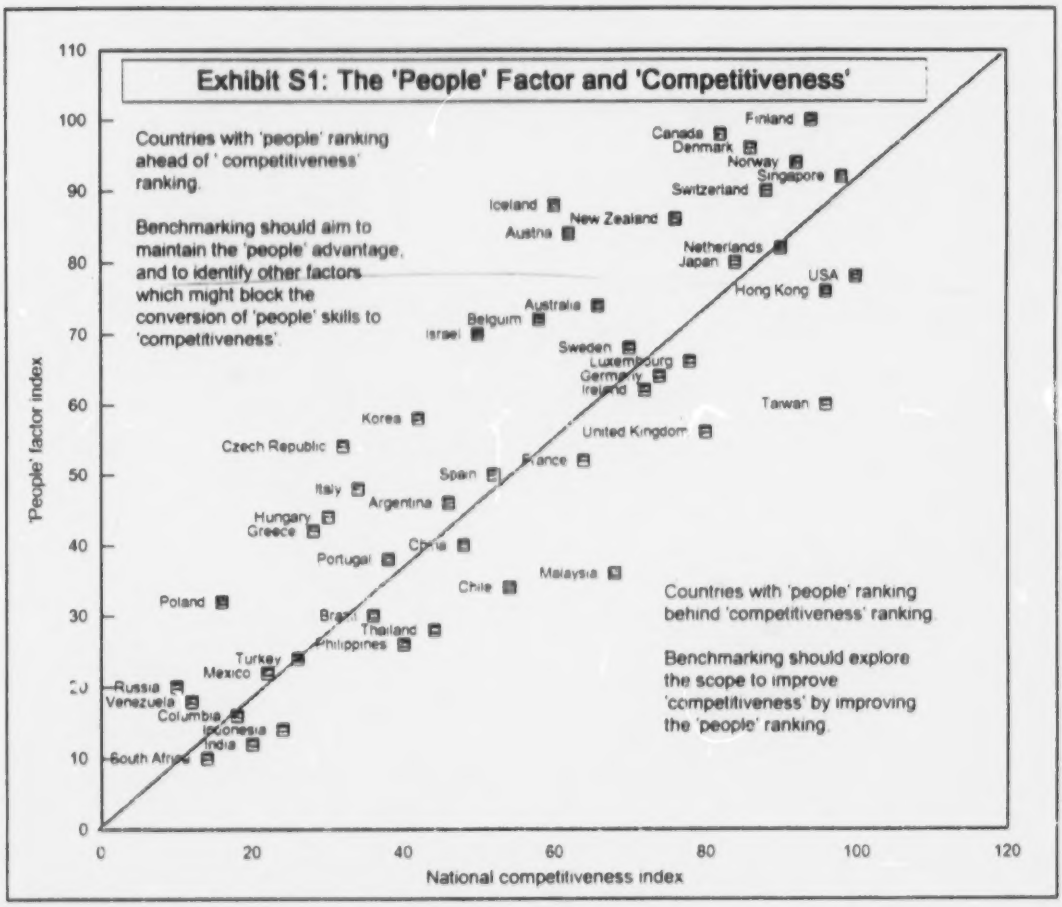
- Measure profile and skill gaps between new entrants and older members of the workforce, compare them to gaps in other countries, and report annually on required strategic actions.

- Conduct ongoing U.K.-style audits of standards, to benchmark Australian qualifications against those of selected countries, to ensure that Australian qualifications continue to match or exceed overseas standards.

- Conduct Pilot Benchmarking Projects focused on sectors (e.g. VET) or industries (e.g. Manufacturing Food). Use these Projects to assist education and training and industries to work together to add to the international competitiveness of Australian workskills and industries.

- Require Strategic Planning and Policy Proposals to include a competitiveness impact statement, which explores the impact on international competitiveness of Australian workskills. Ensure that the impact statements are themselves evaluated, and that industries and students are involved in the process.

The World Competitiveness Yearbook 1997 data differentiate between countries on the basis of competitiveness, and show a strong correlation between 'national competitiveness' rankings and 'people' factor rankings. A comparison of rankings suggests that the 'people' factor may drive competitiveness improvement in countries positioned significantly above the diagonal line. Conversely, where the country is positioned significantly below the diagonal line, the 'people' factor may be a restraint on competitiveness.



Source: Rankings from The World Competitiveness Yearbook 1997. Lausanne, Switzerland: IMD, 1997.
Rankings for overall 'competitiveness' and for the 'people' factor converted to an index 1-100 (Index = (51-Rank)/50*100)
Analysis: Performance Management Solutions, 1997.

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Exhibit S2: Australian Competitiveness Rankings 1994 -1997

	Ranking			Improve -ment in ranking	Factor ranking relative to competitiveness ranking		
	1994	1996	*1997*	1994-1997	1994	1996	*1997*
OVERALL COMPETITIVENESS	16	21	18	-2	+0	+0	+0
Management	23	25	19	+4	-7	-4	+1
Science & technology	16	21	24	-8	-0	0	-6
People	**19**	**18**	**14**	+5	**-3**	**+3**	**+4**
Internationalization	26	29	28	-2	-10	-8	-10
Finance	14	15	18	-4	+2	+6	0
Government	12	13	14	-2	+4	+8	+4
Domestic economic strength	18	18	22	-4	-2	+3	-4
Infrastructure	5	6	8	-3	+11	+15	+10

Note: Although the 'people' factor is broader than 'workskills', it contains workskill elements, and is used here to simplify comparisons with other rankings.

Australia has a higher ranking on 'people' (workskills) than on other variables, such as 'management', 'science and technology', and 'internationalization'.

Source: Factor rankings from The World Competitiveness Yearbook 1997. Lausanne, Switzerland: IMD, 1997.
Analysis: Performance Management Solutions, 1997

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Exhibit S3: Country Qualification Profiles: OECD, 1996

POST - COMPULSORY RANKING

	Profile		Profile rank	
USA	85.1		1	
Germany	84.0		2	
Norway	80.7		3	
Switzerland	80.0		4	
United Kingdom	74.3		5	
Canada	74.1		6	
Czech Republic	73.0		7	
Sweden	72.8		8	
Austria	68.1		9	
France	67.1		10	
Finland	63.6		11	
Denmark	60.0		12	
Netherlands	59.8		13	
New Zealand	54.5		14	
Australia	**50.2**	**(53.0)**	**15**	**(15)**
Belgium	49.4		16	
Ireland	45.1		17	
Greece	44.5		18	
Italy	33.2		19	
Spain	26.2		20	
Turkey	19.8		21	
Portugal	19.1		22	

POST - SECONDARY RANKING

	Profile		Profile rank	
Canada	45.8		1	
USA	32.2		2	
Norway	27.4		3	
Sweden	26.9		4	
Australia	**23.1**	**(20.1)**	**5**	**(11)**
Belgium	22.3		6	
Germany	22.1		7	
New Zealand	22.1		8	
Netherlands	21.4		9	
United Kingdom	20.9		10	
Switzerland	20.8		11	
Denmark	19.6		12	
Finland	19.4		13	
Ireland	18.5		14	
Greece	17.9		15	
France	17.4		16	
Spain	15.0		17	
Portugal	10.7		18	
Czech Republic	10.0		19	
Austria	7.7		20	
Italy	7.5		21	
Turkey	7.0		22	

DEGREE RANKING

	Profile		Profile rank	
USA	24.4		1	
Netherlands	21.4		2	
Canada	16.9		3	
Norway	16.4		4	
Denmark	13.7		5	
Sweden	13.4		6	
Australia	**13.4**	**(14.2)**	**7**	**(5)**
Germany	12.6		8	
Greece	12.1		9	
United Kingdom	11.7		10	
Spain	11.0		11	
Finland	10.9		12	
Belgium	10.1		13	
Czech Republic	10.0		14	
France	9.2		15	
Ireland	8.8		16	
New Zealand	8.8		17	
Switzerland	8.2		18	
Italy	7.5		19	
Portugal	7.2		20	
Turkey	7.0		21	
Austria	5.6		22	

Profile data from Education at a Glance - OECD Indicators 1996. These data are for the most part 1994 country data.

All post-compulsory = ['Year 12' plus 'skilled vocational' plus some 'assoc. diploma'] + ['u/g diploma' (excluding nursing and ed. + some 'assoc. diploma'] + [degree (including diploma level nursing and

All post-secondary = ['undergraduate diploma' (excluding nursing and education] + some 'associate diploma'] + [degree and postgraduate (including diploma level nursing and education)]

All degree = [degree (including postgraduate and diploma level nursing and education)]

Australia ( ) is the adjusted profile discussed in Appendix B.

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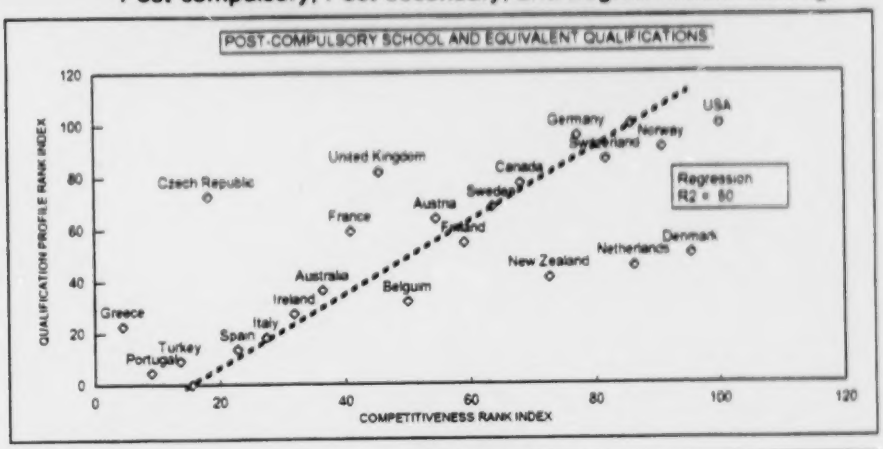
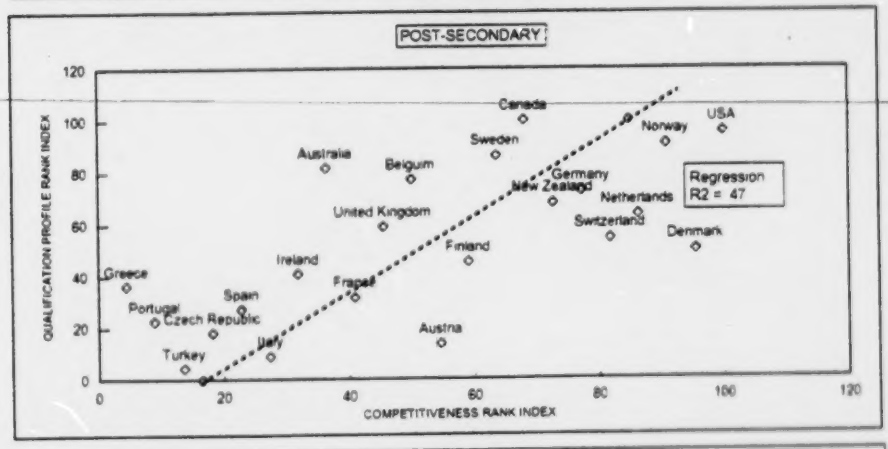
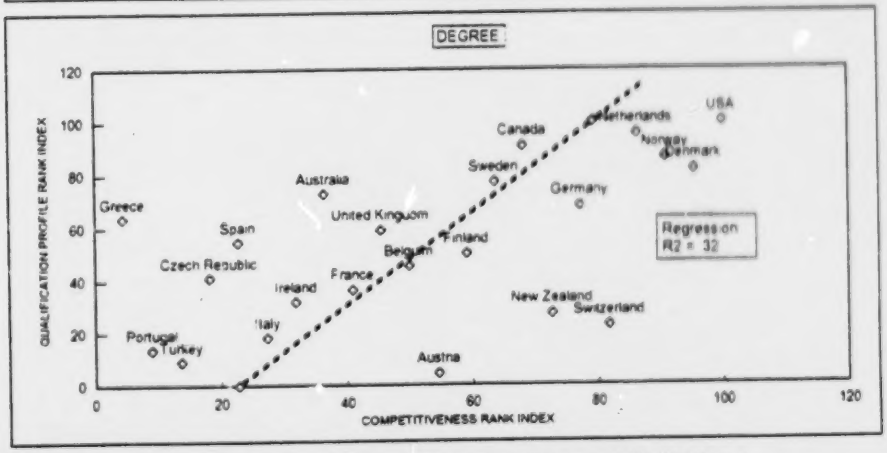
There is a strong correlation between country rankings based on qualification profiles and competitiveness rankings. The most significant correlation is with all post-compulsory qualifications followed by all post-secondary qualifications, followed by degrees. This suggests that development needs to be balanced across the three qualification profile measures examined.

Exhibit S4: Relationship Between Competitiveness Rankings and Post-compulsory, Post-secondary, and Degree Profile Rankings







Sources: Country qualification profiles: Education at a Glance - OECD Indicators 1996. Paris: OECD, 1996. Country competitiveness rankings: 'The World Competitiveness Yearbook 1997'. Lausanne, Switzerland: IMD, 1997.
Profiles converted to rankings: Rankings converted into indices 1-100: (Index = (23-ranking)/22*100)
Analysis: Performance Management Solutions, 1997

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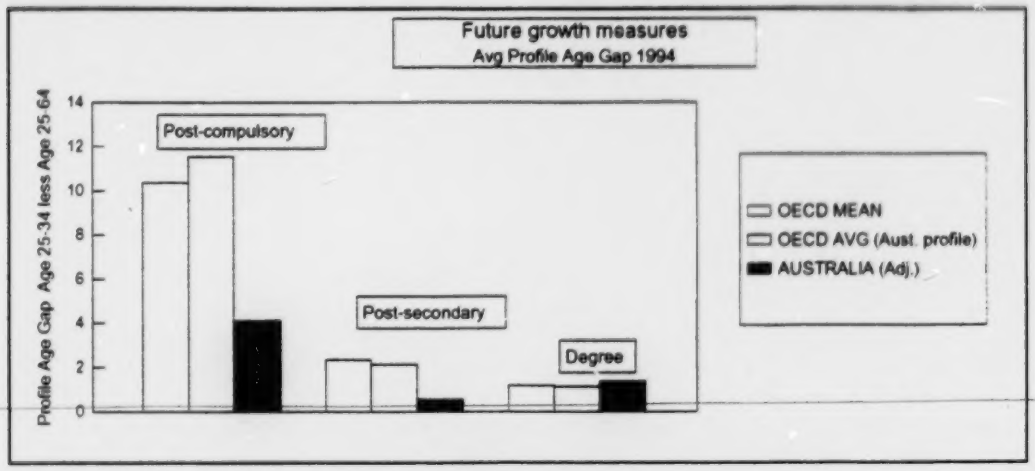
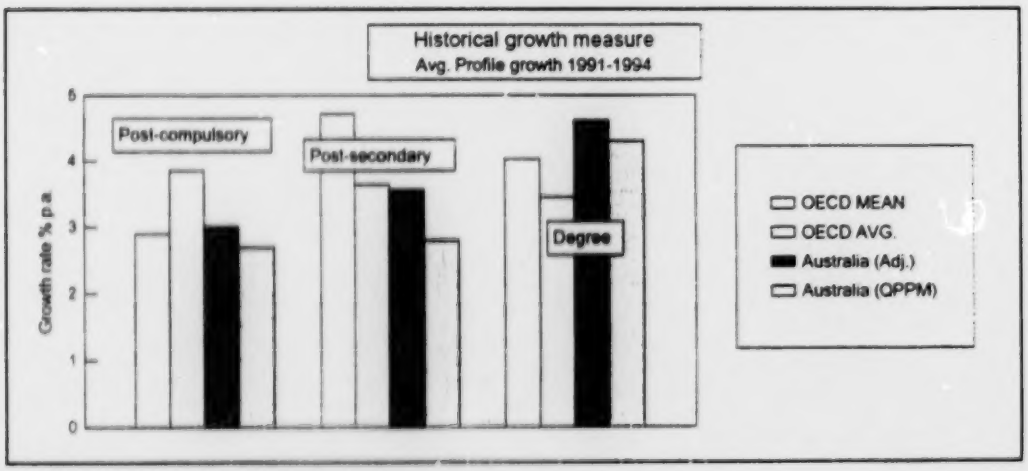
To ensure future competitiveness, Australia's Qualification Profiles need to grow at least as rapidly as those of key competitors. Yet over the period 1991-1994, Australia's profile grew less rapidly than the OECD average. An analysis of Profile Age Gaps suggests that, unless action is taken to match the growth of other nations, the position of Australia is likely to decline.

Exhibit S5: Australian Qualification Profile Growth Compared with OECD Averages





Sources

Education at a Glance - OECD Indicators 1996.

Australian adjusted growth estimates are detailed in Appendix B.

Australia QPPM estimates are from the Qualification Profile Projection Model which has linked the two ABS data series.

Analysis

OECD average growth and average Profile Age Gap are forecast as a function of each qualification profile rank index. Comparisons with Australia use the average OECD index measured at the Australian qualification profile rank index.

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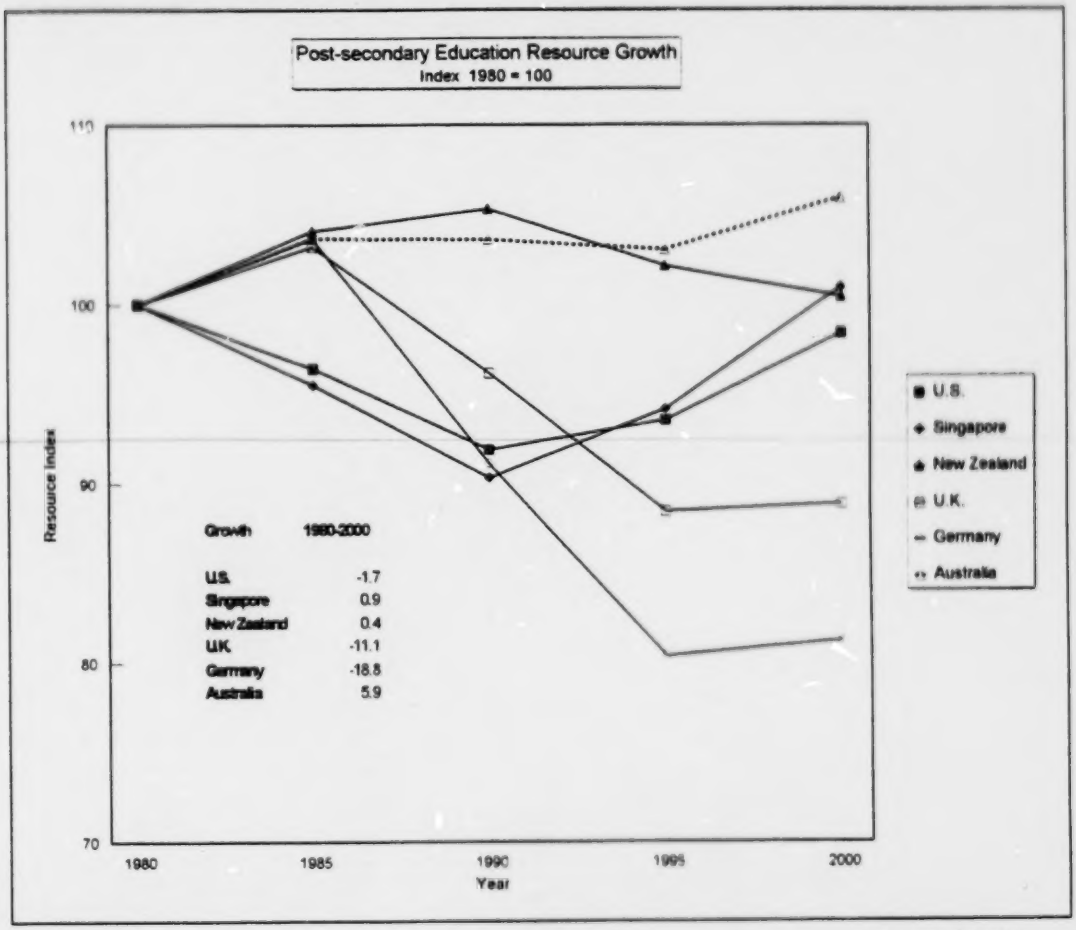
Population growth differences mean that countries require different levels of resource growth in education and training to maintain existing profiles. Over the period 1980-2000, Australia is the only benchmark country which requires resource growth to maintain historical profiles.

Exhibit S6: Growth in Resources to Maintain 1990 Qualification Profiles



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Population data: "World Population Projections: Estimates and Projections with Related Demographic Statistics: A World Bank Book", by Eduard Bos et al. Baltimore, Maryland: Johns Hopkins University Press, 1994.

Analysis: Performance Management Solutions, 1997.

SECTION ONE: INTRODUCTION

Education and training should be a source of relative advantage for Australia. The nation started the decade with relatively high stocks of qualified persons and moved early to reform national and state-based education and training systems. However, the competitive benefits expected from the "clever country" strategy have been slow to emerge. Australian competitiveness actually declined between 1994 and 1997.

This Report examines the links between national competitiveness and workskills, as measured by the stocks of education and training qualifications in selected benchmark countries. The objectives are to compare Australian qualification stocks and competitiveness with those of selected countries and to identify options to improve Australia's competitiveness by adjusting education and training reform priorities.

If education and training reform in Australia is to translate into a source of competitive advantage, Australian workskills need to match and surpass those developed by other nations. Since most nations are reforming their education and training systems and since improvement in the competitiveness of national workskills is a key objective of many of the reforms, the focus of this analysis must be external. The analysis must also focus on competitiveness, that is, on identifying world best practice solutions to enable the Australian education and training system to assist Australian industries to compete more effectively in world markets. Competitiveness requires an education and training system which delivers to the workforce stocks of qualifications which are competitive with those in other countries. It also requires an education and training system which is able to work with industries to align education and training priorities with future industry needs in order to deliver cost-effective workskills within individual enterprises.

The stock of qualifications in the working age population is one measure which can be used to compare the workskills of different countries. Workskills result from the employment and ongoing education and training of persons. Many of these persons bring to the workforce an initial qualification, and many add to that initial qualification as part of a process of ongoing workskill development. The workskill creation process involves: initial general and vocational education and training; decisions by enterprises to employ, to train, and to cease to employ persons, in order to optimise workskills and deliver competitive advantage; and decisions taken by individuals about career paths and skills development.

Implications of this analysis for education and training reform in Australia

Australian competitiveness declined between 1994 and 1996. In 1997, although competitiveness increased and The World Competitiveness Yearbook 1997 reports that Australia appears to have turned the corner, Australia has not yet regained the competitiveness ranking recorded in 1994, let alone delivered the national agenda to become more competitive.[1] The decline does not mean that Australia is a less efficient producer of either qualifications or of goods and services than it was in 1994; rather, the decline suggests that other countries are performing more effectively. Some of these

[1] The World Competitiveness Yearbook 1997. Lausanne, Switzerland: IMD, 1997.

countries, for example Singapore and New Zealand, are geographically close to Australia.

Three results from this external benchmarking analysis have particular implications for the future direction of education and training reform in Australia.

- First, when Australian qualification stocks are compared with those of other OECD countries, there is an imbalance between Australia's ranking on degrees (5-7) and the ranking for all post-compulsory qualifications (15). This seems likely to restrain attempts to improve national competitiveness, unless the imbalance is corrected by maintaining the competitiveness of the degree ranking while also increasing the post-compulsory ranking.

- Second, notwithstanding major growth in education and training resources and outputs over the last few years, Australian qualification stocks, measured as a proportion of the Age 25-64 population (qualification profile), have grown less rapidly than those in many OECD countries. An analysis of future profile growth across all OECD countries suggests that the post-compulsory qualification ranking for Australia is likely to weaken further, unless growth is accelerated, particularly at the 'Year 12' and 'skilled vocational' level of qualifications.

- Third, the failure to match the qualification profile growth of key competitors is partly explained by the relatively high level of education and training resources required to maintain Australia's existing qualification stocks as a proportion of the growing overall population. Relative demographic trends in Australia compared with those of other countries suggest that the resource level required to maintain existing profiles is increasing in Australia, whereas in other benchmark countries the level is reducing.

Three levels of external analysis

In Australia, the thrust of education and training reform has tended to focus on funding and access and domestic competition between providers, rather than on the skills required by industries to compete in a global marketplace. Adding value to education and training reform requires a shift from internal to external priorities.

External benchmarking seeks to focus attention on external factors and to identify strategies for improvement. This Report conducts analysis at three levels, which are summarised in *Exhibit 1.1: External Benchmark Levels Used in this Report*

- ***Aggregate level analysis*** presents an overview of all countries for which suitable data are available. Two data sets are examined: the 46 countries evaluated in The World Competitiveness Yearbook 1997, and the 22 countries reporting education and training data through the OECD education statistics analysed in Education at a Glance - OECD Indicators (1996). This level of analysis is useful for positioning Australia and exploring the validity of relationships.

- ***Competitiveness level analysis*** examines the 17 countries evaluated in The World Competitiveness Yearbook 1997 as more competitive than Australia in 1997, and explores options for improving Australia's relative position. This level of analysis is used to identify opportunities for improvement.

Exhibit 1.1 External Benchmark Levels Used in this Report

AGGREGATE LEVEL		COMPETITIVENESS LEVEL	BENCHMARK LEVEL
World Competitiveness Yearbook 1997	OECD Education data base	All countries ranked more competitive than Australia	
USA	USA	USA	USA
Singapore	Denmark	Singapore	Singapore
Hong Kong	Norway	Hong Kong	Germany
Japan	Netherlands	Japan	New Zealand
Denmark	Switzerland	Denmark	United Kingdom
Norway	Germany	Norway	**Australia**
Netherlands	New Zealand	Netherlands	
Luxembourg	Canada	Luxembourg	
Switzerland	Sweden	Switzerland	
Germany	Finland	Germany	
New Zealand	Austria	New Zealand	
Canada	Belgium	Canada	
Chile	United Kingdom	Chile	
Sweden	France	Sweden	
Finland	**Australia**	Finland	
Austria	Ireland	Austria	
Belgium	Italy	Belgium	
Taiwan	Spain	Taiwan	
United Kingdom	Czech Republic	United Kingdom	
France	Turkey	France	
Australia	Portugal	**Australia**	
Ireland	Greece		
Malaysia			
Israel			
Iceland			
China			
Korea			
Italy			
Spain			
Thailand			
Philippines			
Argentina			
Columbia			
Czech Republic			
Turkey			
Portugal			
Brazil			
India			
Hungary			
Greece			
Indonesia			
Mexico			
Poland			
South Africa			
Venezuela			
Russia			

- ***Benchmark level analysis*** focuses on selected countries and seeks to examine the processes of education reform and competitiveness against the processes used in Australia. This detailed comparative analysis is used: to test specific opportunities for improvement; to explore implementation issues; and to project the impact of future change on overall competitiveness.

Benchmark countries

The benchmark countries used in this analysis are the U.S., Singapore, Germany, New Zealand, and the U.K. All these countries are evaluated in The World Competitiveness Yearbook 1997 as being more competitive than Australia. The U.S. and Germany have far higher stocks of qualifications than Australia, measured in relation to their populations. A third country, Singapore, has developed strategies to build the national qualifications stocks and to translate them into national competitiveness. The U.K. is experiencing a major growth in qualifications. New Zealand has a more integrated post-school system, a higher post-compulsory profile, and a lower degree profile than Australia.

The structure of this Report

Section Two examines transitions to national competitiveness and argues that education and training reform cannot develop in isolation. Each country must address different priorities and different transitions to competitiveness.

Section Three examines the relationship between qualification stocks and national competitiveness, and discusses the implications for national education and training reform.

Section Four examines future shifts in qualification profiles for Australia and for the benchmark countries. This analysis suggests that Australia is likely to slip seriously behind competitors over the next few years, particularly at the upper high school and key vocational qualifications level.

Section Five examines education and training reform, and the links between education and training reform and industry competitiveness in selected countries. Changing the supply-side of the education and training system, without also reforming the regulatory and market systems which seek to align education and training priorities with the future needs of industries, is a recipe for weak competitive and employment outcomes. The capacity of education and training reform to add value to national workskills depends upon the mix of core skills delivered and on the capacity of the education and training system and enterprises to work together to create and sustain competitive workskills.

Section Six examines opportunities for improving the competitiveness of the Australian workforce. Threats and opportunities are identified and an agenda for improvement is proposed.

SUMMARY

Education and training should be a source of relative advantage for Australia. However, the competitive benefits expected from the "clever country" strategy have been slow to emerge. Australian competitiveness actually declined between 1991 and 1994. This Report examines the links between national competitiveness and workskills, as measured by the stocks of education and training qualifications across 22 OECD countries and, in more detail, between Australia and five selected benchmark countries (U.S., Singapore, Germany, New Zealand, U.K.)

The stock of qualifications in the working age population is one measure which can be used to compare the workskills of different countries. Although there has been growth in the resources available to post-compulsory education sectors in Australia, qualification stocks, measured as a proportion of the Age 25-64 population, have grown less rapidly than for other OECD countries over the period 1991-1994 and, with the possible exception of degree stocks, seem likely to grow less rapidly in future.

The analysis identifies three issues which education and training changes in Australia need to address.

- First, when Australian qualification stocks are compared with those of other OECD countries, there is an imbalance between Australia's ranking on degrees (5) and the ranking for all post-compulsory qualifications (15). Unless corrected, this imbalance seems likely to restrain attempts to improve national competitiveness.

- Second, an analysis of future profile growth across all OECD countries suggests that other countries are growing faster than Australia. Unless growth is accelerated, particularly at the 'Year 12' and 'skilled vocational' level of qualifications, Australia's ranking is likely to weaken further.

- Third, the failure to match the qualification profile growth of key competitors is partly explained by the relatively high level of education and training resources required to maintain Australia's existing qualification stocks as a proportion of the growing overall population.

SECTION TWO: NATIONAL COMPETITIVENESS

Competitiveness can be defined as the ability of a country to generate proportionately more wealth than its competitors in world markets. Governments in most countries, when facilitating the expansion in education and training, expect to gain competitive value from enhanced workskills. However, competitiveness is a relative concept. To obtain competitive benefits from education and training reform in an increasingly global world, a country needs to perform better than its competitors.

Each country must address different priorities and different transitions to achieve competitiveness. For a country to maintain its competitive position, education and training priorities need to keep pace with global change. However, to create a source of national competitive advantage, education and training reform also needs to address specific country differences and to find ways to implement reform faster and more effectively than others.

The 'World Competitiveness Project' has evaluated national competitiveness for several years. Results are published each year in The World Competitiveness Yearbook[2], which defines competitiveness in terms of the ability of a country to access a share of world resources. The multidimensional methodology used to measure competitiveness focuses on eight factors: 'domestic economic strength', 'internationalization', 'finance', 'government', 'infrastructure', 'management', 'science and technology', and 'people'. Each factor is measured by combining a range of measures, hard data, and questionnaire data. A strength of the methodology is the existence of historical data for many of the countries.

The Yearbook provides a valuable source of benchmark material and one of the few available measures of national competitiveness. *Exhibit 2.1: Australian Competitiveness Rankings 1994-1997* focuses on changes in the rankings for Australia. Australia's ranking has slipped from 16 in 1994 to 21 in 1996 and recovered to 18 in 1997. Over the same period, New Zealand has increased its competitiveness from 15 to 13.

Exhibit 2.2: Australia 1994-1997: Transition Grid analyses the shifts in factor rankings for Australia against a measure of factor impact. Factors to the right of the grid have improved their ranking over the period. Factors in the upper part of the grid are potential drivers of improvements in competitiveness. Factors in the lower part of the grid are potential constraints to improved competitiveness. Over the period 1994 to 1997, the only factors for Australia which improved their relative position were the 'people' and 'management' factors. All other factors decreased. The largest decreases were in 'science and technology', 'finance' and 'domestic economic strength'.

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[2]The Report has been published under a number of different titles. Earlier Reports were published in Lausanne jointly by IMD and the World Economic Forum, and were entitled The World Competitiveness Report. In 1996 and 1997 the Reports were published by IMD alone, and are entitled The World Competitiveness Yearbook. The 1996 and 1997 Reports maintain the previous methodology and present national rankings for both competitiveness and the main competitiveness factors from 1994 to 1997.

The World Competitiveness Yearbook 1997 estimates that Australian competitiveness has increased since 1996 but remains below the competitiveness ranking achieved in 1994, and that the only competitiveness factors to have become more competitive since 1994 are the 'people' and the 'management' factors.

Table 2.1: Australian Competitiveness Rankings 1994 -1997

	Ranking			Improve -ment in ranking	Factor ranking relative to competitiveness ranking		
	1994	1996	*1997*	1994-1997	1994	1996	*1997*
OVERALL COMPETITIVENESS	16	21	18	-2	+0	+0	+0
Management	23	25	19	+4	-7	-4	+1
Science & technology	16	21	24	-8	-0	0	-6
People	19	18	14	+5	-3	+3	+4
Internationalization	26	29	28	-2	-10	-8	-10
Finance	14	15	18	-4	+2	+6	0
Government	12	13	14	-2	+4	+8	+4
Domestic economic strength	18	18	22	-4	-2	+3	-4
Infrastructure	5	6	8	-3	+11	+15	+10

Note: Although the 'people' factor is broader than 'workskills', it contains workskill elements, and is used here to simplify comparisons with other rankings.

Australia has a higher ranking on 'people' (workskills) than on other variables, such as 'management', 'science and technology', and 'internationalization'.

Source: Factor rankings from The World Competitiveness Yearbook 1997. Lausanne, Switzerland: IMD, 1997. Analysis: Performance Management Solutions, 1997.

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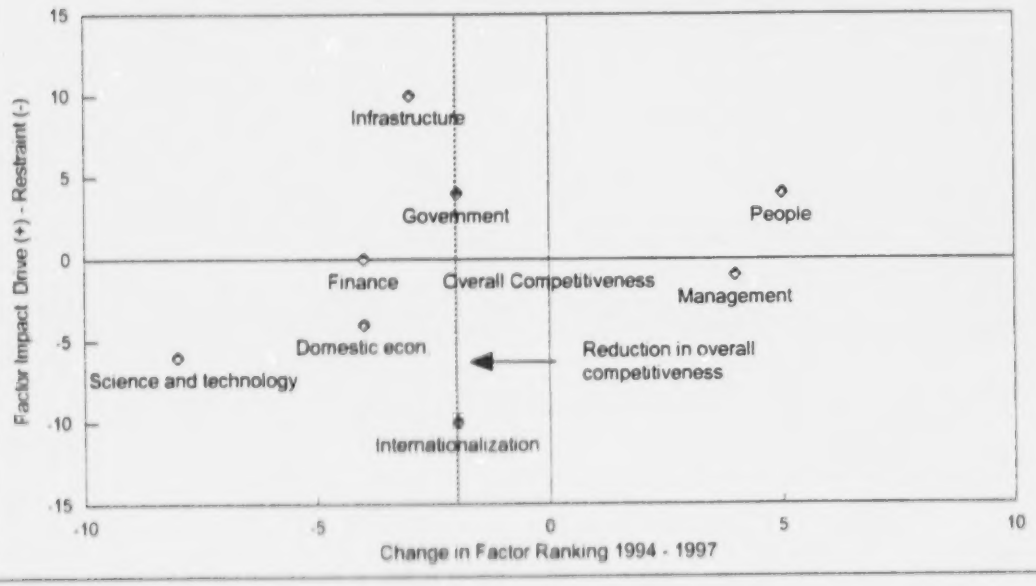
Governments in most countries, when facilitating the expansion in education and training, expect to gain competitive value from enhanced workskills. However, to obtain these benefits in an increasingly global world, a country needs to perform better than other countries. By most measures, workskills in Australia have increased in recent years; however, these improvements have not been translated into a general improvement in national competitiveness.

Factors to the right of the grid have improved their ranking over the period. Factors in the upper part of the grid are potential drivers of improvements in competitiveness. Factors in the lower part of the grid are potential restraints to improved competitiveness.

Exhibit 2.2: Australia 1994 - 1997: Transition Grid



Source: Rankings from The World Competitiveness Yearbook 1997. Lausanne, Switzerland: IMD, 1997
Factor impacts = Competitiveness ranking less factor ranking
Analysis: Performance Management Solutions, 1997

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It is important to explore why this has not occurred. Have other factors offset improvements in workskills? Has the process produced the wrong mix of workskills for the future needs of industry? Has Australian management met the challenge of translating new workskills proactively into added competitive value for particular industries? Is Australia chasing a moving target in the sense that, although workskills are improving, other countries are performing more effectively?

Education and training reform cannot be benchmarked in isolation from other changes. At one level, decreases may offset the value sought from education and training reform. At another level, weaknesses in the Australian economy may pose more direct challenges for education and training reform. For example, the decrease in 'science and technology' may be a threat because it may encourage the education and training system to focus on other priorities. In addition, the decrease in 'internationalization' may be a threat because it could allow education and training reform to become insular, and it may defer the need to provide Australians with the skills required to support access to the global market place and to enable the nation to access an increasing share of world resources.

Aggregate level analysis

The 'World Competitiveness Project' provides measures of national competitiveness and related factors which can be used to develop national benchmarks. *Exhibit 2.3: The 'People' Factor and 'Competitiveness'* details the 'competitiveness' and 'people' factor rankings of 46 countries.

Exhibit 2.3 shows a strong correlation between the 'people' factor score for a country and its overall competitiveness. Although the correlation is strong, it is clearly a partial correlation, for example, the higher 'people' score for New Zealand compared with the U.S. does not translate into a higher 'competitiveness.'[3]

If it is assumed that a high 'people' ranking is one of the factors which determines overall competitiveness, the difference between the 'competitiveness' ranking and the 'people' factor ranking can be used to identify countries where the 'people' factor may be a constraint to 'competitiveness' and other countries where the 'people' factor may drive improvements in 'competitiveness.' Australia is identified as a country in the latter group. This suggests the possibility that blockages in the process which translates 'people' strengths to 'competitiveness' need to be explored as part of any improvement process.[4]

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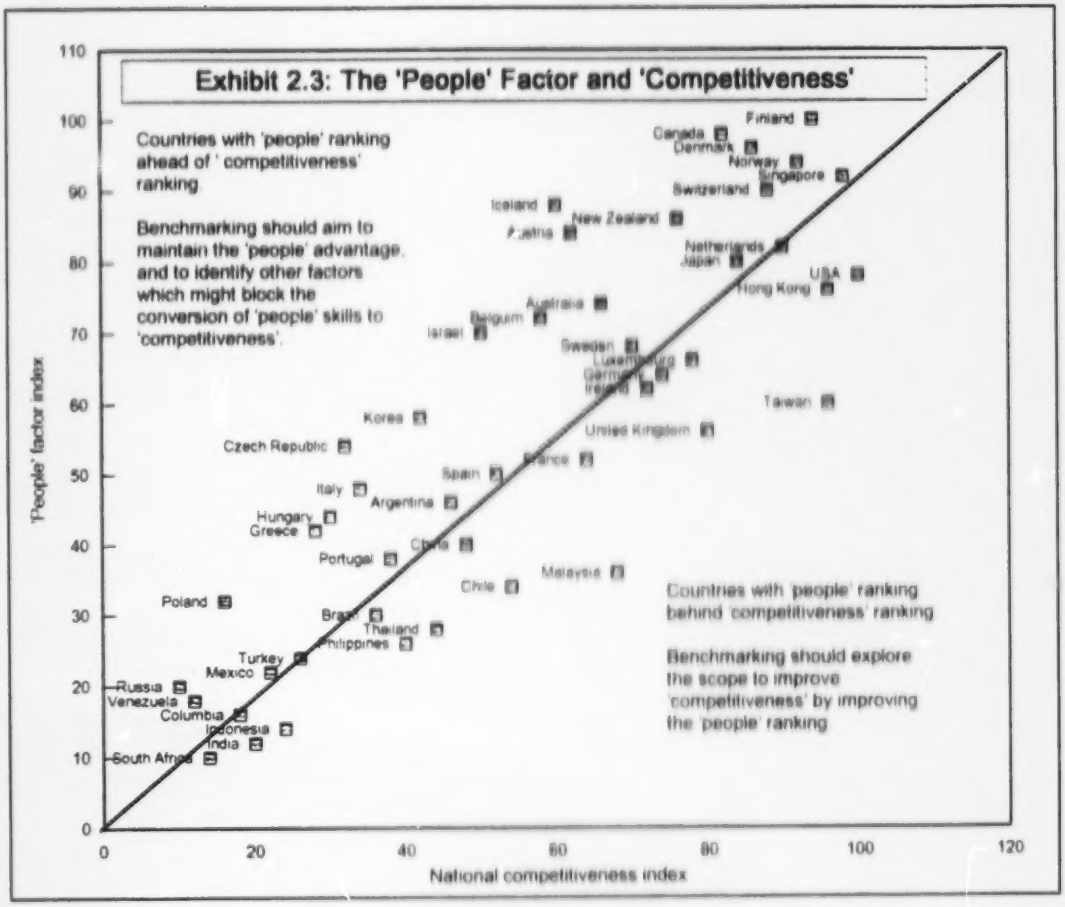
[3] There are other powerful variables impacting on competitiveness which will be considered later. In addition, the factor measures are imperfect, and the dynamics of the links between the shifts in factor rankings and shifts in competitiveness are complex. While no one should expect a direct correlation, strong partial correlations suggest that one strategy to optimise competitiveness is to optimize each of the competitiveness factors.

[4] The World Competitiveness Yearbook 'people' factor measures a number of different elements: population characteristics, labor force characteristics, employment and unemployment, educational structures, quality of life, and attitudes and values. For some countries, education differences appear to be offset by other factors. For example, the U.S. and U.K., which might be expected to rank more highly on the basis of education and training in isolation, have these effects masked by low rankings on other measures.

The World Competitiveness Yearbook 1997 data differentiate between countries on the basis of competitiveness, and show a strong correlation between 'national competitiveness' rankings and 'people' factor rankings. A comparison of rankings suggests that the 'people' factor may drive competitiveness improvement in countries positioned significantly above the diagonal line. Conversely, where the country is positioned significantly below the diagonal line, the 'people' factor may be a restraint on competitiveness.



Source: Rankings from The World Competitiveness Yearbook 1997. Lausanne, Switzerland: IMD, 1997.
Rankings for overall 'competitiveness' and for the 'people' factor converted to an index 1-100 (Index = (51-Rank)/50*100)
Analysis: Performance Management Solutions, 1997

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The World Competitiveness Yearbook 1997 identifies 17 countries as being more competitive than Australia. The factor rankings are compared with overall competitiveness rankings to identify factors likely to drive or restrain competitiveness in each country. Each country must address different priorities and different transitions to competitiveness. Education and training reform cannot be benchmarked in isolation from these changes.

Exhibit 2.4: World Competitiveness Benchmarks: Competitiveness Ranking Less Factor Ranking

Base Competitiveness Ranking		Domestic Economic Strength	International -ization	Government	Finance	Infrastructure	Management	Science & Technology	People
1	USA	0	0	-6	0	0	-2	0	-11
2	Singapore	-1	0	1	-4	-9	1	-6	-3
3	Taiwan	-14	-27	-17	-20	-25	-15	-7	-18
3	Hong Kong	-6	0	1	-9	-16	1	-15	-10
4	Finland	-19	-9	-11	-9	1	-4	-2	3
5	Norway	-3	-18	-8	-6	3	-8	-6	1
6	Netherlands	-10	0	-16	4	-6	2	-6	-4
7	Switzerland	-25	-19	2	4	-2	-2	2	1
8	Denmark	-10	-1	-15	4	3	3	-15	5
9	Japan	3	-23	-19	4	-11	2	7	-2
10	Canada	-11	-9	1	0	4	0	1	8
11	United Kingdon	-8	7	3	3	-5	-3	-3	-12
12	Luxembourg	8	7	-12	5	-5	-4	-5	-6
13	New Zealand	-21	-9	10	-2	0	2	-3	5
14	Germany	-12	7	-11	5	7	-11	11	-5
15	Ireland	10	3	3	-5	-7	3	8	-5
16	Sweden	-15	5	-22	2	12	10	-5	-1
17	Malaysia	15	0	13	-2	-10	0	-8	-16
18	Australia	-4	-10	4	0	10	-1	-6	4

Factors are those measured by The World Competitiveness Yearbook 1997. A negative figure represents a potential restraint on competitiveness (factor competitiveness lower than the overall competitiveness.) A positive figure represents a potential driver for competitiveness (factor competitiveness higher than national competitiveness.)

Source: The World Competitiveness Yearbook, 1997. Lausanne, Switzerland: IMD, 1997. Rankings for all countries ranked more competitive than Australia.

Analysis: Performance Management Solutions, 1997.

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Competitiveness level analysis

Exhibit 2.4: World Competitiveness Benchmarks: Competitiveness Ranking Less Factor Ranking focuses on the 17 countries identified as more competitive than Australia, and examines the relationship between 'competitiveness' and the 'people' factors used in The World Competitiveness Yearbook 1997. Thirteen of these countries are evaluated as having a higher 'people' score than Australia. In addition, Exhibit 2.4 examines the other factors used by The World Competitiveness Yearbook 1997; for example, the U.K. has a lower 'people' score and a higher 'competitiveness score' than Australia.

Benchmark level analysis

Of the 17 countries evaluated as being more competitive than Australia, five have been selected for more detailed analysis: the U.S., Singapore, U.K., Germany, and New Zealand. Selection was based on the need to examine different systems and on the availability of detailed information to facilitate the benchmarking exercise. *Exhibit 2.5: World Competitiveness Rankings: Selected Benchmark Countries* summarises the factor rankings for these countries. Exhibit 2.5 also classifies factors as possible drivers or restraints to competitiveness. A number of key differences can be identified from an examination of Exhibit 2.5.

- Competitiveness in the U.S appears to be driven by 'domestic economic strength', 'internationalization', 'finance', 'infrastructure', and 'science and technology.' Restraints are identified as 'government' and 'people.'

- Competitiveness in Singapore appears to be driven by strengths in 'internationalization,' 'government', and 'management.' Restraints are identified as 'finance', 'infrastructure', and 'science and technology.'

- Competitiveness in the United Kingdom appears to be driven by 'internationalization' and 'infrastrucutre.' Restraints are identified as 'domestic economic strength' and 'people.'

- Competitiveness in New Zealand appears to be driven by 'government' and 'people.' Restraints are identified as 'internationalization' and 'domestic economic strength.'

- Competitiveness in Germany appears to be driven by 'internationalization', 'infrastructure', and 'science and technology.' Restraints are identified as 'domestic economic strength', 'government', 'management' and 'people.'

- Competitiveness in Australia appears to be driven by 'infrastructure', 'government', and 'people.' Restraints are identified as 'internationalization', 'domestic economic strength', and 'science and technology.'

Each benchmark country has a different mix of competitiveness factors. Competitiveness in Australia appears to be driven by 'infrastructure' 'government' and 'people'. Restraints are identified as 'internationalization' 'domestic economic strength' and 'science and technology.'

Exhibit 2.5: World Competitiveness Rankings: Selected Benchmark Countries

Base Competitiveness Ranking		Domestic Economic Strength	International -ization	Government	Finance	Infrastructure	Management	Science & Technology	People
1	U.S.	1	1	7	1	1	3	1	12
2	Singapore	3	2	1	6	11	1	8	5
11	United Kingdom	19	4	8	8	16	14	14	23
13	New Zealand	34	22	3	15	13	11	16	8
14	Germany	26	7	25	9	7	25	3	19
18	Australia	22	28	14	18	8	19	24	14

Impact on Competitiveness

U.S.	Driver	Driver	Restraint	Driver	Driver		Driver	Restraint
Singapore		Driver	Driver	Restraint	Restraint	Driver	Restraint	
United Kingdom	Restraint	Driver			Driver			Restraint
New Zealand	Restraint	Restraint	Driver					Driver
Germany	Restraint	Driver	Restraint	Driver	Driver	Restraint	Driver	Restraint
Australia	Restraint	Restraint	Driver		Driver		Restraint	Driver

Source: Rankings from The World Competitiveness Yearbook 1997. Lausanne, Switzerland: IMD, 1997.
Analysis: Performance Management Solutions, 1997.
Impact measures are factor ranking less 'competitiveness' ranking from Exhibit 2.4.
Differences greater than +3 = drivers. In the case of highly competitive countries (U.S. and Singapore) drivers include all ranks equal or less than competitiveness.
Differences less than -3 = restraints.

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SUMMARY

Each year IMD analyses the competitiveness of 46 countries and produces The World Competitiveness Yearbook which is a useful source of data for international benchmarking. The 1997 edition estimates that Australian competitiveness has increased over 1996 but remains below the competitiveness ranking achieved in 1994, and that the only competitiveness factors to become more competitive since 1994 are the 'people' and 'management' factors.

These data suggest that to reverse declining competitiveness, Australia needs to address restraint factors while maintaining 'people' competitiveness and ensuring that the processes which convert 'people' strengths into 'national competitiveness' reflect world best practice.

The World Competitiveness Yearbook identifies eight factors which contribute to national competitiveness. One of these factors, the 'people' factor, measures a range of social factors including education and labour market factors.

Four points are drawn from an analysis of data.

- The 1997 national competitiveness ranking identifies 17 countries as being more competitive than Australia. They include all of the five benchmark countries addressed in detail in this Report (U.S., Singapore, Germany, New Zealand, and the U.K.)

- To identify factors likely to 'drive' or 'restrain' improvements in national competitiveness in each benchmark country, factor rankings are compared with the overall competitiveness ranking. For Australia, the likely drivers are identified as 'infrastructure', 'government', and 'people' and the likely restraints as 'internationalization', 'domestic economic strength' and 'science and technology'.

- Transition analysis suggests that only two factors, 'people' and 'management' have become more competitive over the period 1994-1996. Reduction in Australia's relative performance of the 'internationalization' and 'science and technology' factors presents problems for national performance and challenges for education and training reform. The rapid decline in the relative performance of the 'science and technology' factor, from a driver to a restraint, may indicate a new threat to national competitiveness.

- Analysis of the data of 46 countries included in the World CompetitivnessYearbook 1997 shows a strong correlation between 'national competitiveness' and the 'people' factor. While each of the eight factors developed for the Yearbook was selected to measure aspects of competitiveness, the correlation between overall competitiveness and the 'people' factor is stronger than the correlation between overall competitiveness and some other factors. This suggests that a relationship exists between the components of the 'people' factor, including education and training and competitiveness. The particular education and training relationship can be explored further using qualification stocks as a measure of workskills.

SECTION THREE: QUALIFICATION PROFILES AND NATIONAL COMPETITIVENESS

An analysis of the OECD qualification profiles against The World Competitiveness Yearbook 1997 competitiveness rankings suggests that at least half the variations in competitiveness between countries in 1997 can be explained in terms of differences between qualification profiles. The most significant qualification profile for explaining differences in competitiveness between OECD countries is 'all post-compulsory' qualifications. This measure includes the final year of high school, major vocational qualification streams such as apprenticeships, and both sub-degree and degree level post-secondary qualifications.

What are the links between education and training outcomes and national competitiveness, and how might they be measured? Competitiveness measures have been reviewed in Section Two. Qualifications stocks are used in this analysis as a measure of workskills, which are a major outcome of education and training systems. Despite the obvious limitations of such measures, there is a clear relationship between country rankings based on stocks of qualifications and national competitiveness. This Section examines the relationship and discusses the implications for national education and training reform.

International qualification frameworks [5]

The OECD publishes measures of the 'highest' qualifications held by each individual in the populations of OECD countries. The measures are published as population profiles, defined as the % of the population (or the workforce) in each country with each 'highest' level qualification. *Exhibit 3.1: The International Standard Classification Used by the OECD (ISCED)* discusses these measures and presents a brief summary of Australian Bureau of Statistics (ABS) measures. The important point to note is that most Australian Vocational Education and Training (VET) awards are included in the OECD upper secondary and equivalent category. The non university post - secondary component is therefore a much narrower measure than the post-secondary measure used by ABS, and it represents a small part of total VET programs. In addition, a significant part of VET activity (basic vocational) appears to be classified below the OECD upper secondary level.

Measures of total qualifications at each level compared with measures of highest qualifications

In order to explore the links between competitiveness and education and training reform, it is necessary to develop measures of total skills in the Age 25-64 population (or workforce). This analysis starts with measures of the total numbers of persons in the population with each qualification; the OECD reports 'highest' qualifications measures which, at each level, exclude those who have qualified and also achieved a higher level qualification. To provide measures of total qualifications at each level, the OECD data for 'highest' qualification have been converted into 'lowest' qualification measures; for example, post-compulsory in the OECD data refers to post-compulsory excluding those who have also gained higher level qualifications

[5] See Appendix A for further discussion of the issues involved in development of such measures.

such as post-secondary and degree. In this Report, post-compulsory refers to post-compulsory and above (post-compulsory plus post-secondary plus degree.)

Exhibit 3.1: The International Standard Classification Used by the OECD (ISCED)

Level used in this Report	OECD description	Equivalent Australian Bureau of Statistics qualification standards
(i) Compulsory (not analysed in this Report)	Early childhood, primary and lower secondary	Completed other levels of school.
(ii) Post-compulsory	L3 - Upper secondary	School Year 12 Skilled vocational (Some) Basic vocational
(iii) Post-secondary	L4 - Non-university tertiary	(Some) Associate diploma Undergraduate diploma
(iv) Degree	L5 - University- level	Degree Postgraduate diploma Postgraduate degrees Other professional nursing (Education undergraduate diploma)

Notes
A discussion of ABS equivalent measures is included as Appendix B.
ABS measures in brackets are adjustments suggested by Performance Management Solutions.
Other 'professional nursing' was included in the OECD published degree level measure for the first time in 1994

Three levels of profile, each defined in terms of the lowest qualification level included, have been used in this analysis.

(a) Post-compulsory: persons completing at least secondary schooling or equivalent level vocational programs ((ii) + (iii) + (iv) above.)

(b) Post-secondary: persons completing at least some post-secondary qualifications to a level significantly above the end of school ((iii) + (iv) above.)

(c) Degree: persons completing degree level programs ((iv) above.)

The results for each of the 22 countries are included in *Exhibit 3.2: Country Qualification Profiles: OECD, 1996.*

The use of qualification profiles rankings compared to the use of absolute profile measures

The purpose of this analysis is to explore relationships between a country's qualification profiles (most of which are growing) and a country's competitiveness ranking (which can only increase if another country's ranking decreases.) If relationships between profiles and competitiveness exist, they are likely to be between country rankings over time, rather than between rankings and absolute profile measures. Indeed, while absolute profile data can be

Exhibit 3.2: Country Qualification Profiles: OECD, 1996

POST - COMPULSORY RANKING

	Profile		Profile rank	
USA	85.1		1	
Germany	84.0		2	
Norway	80.7		3	
Switzerland	80.0		4	
United Kingdom	74.3		5	
Canada	74.1		6	
Czech Republic	73.0		7	
Sweden	72.8		8	
Austria	68.1		9	
France	67.1		10	
Finland	63.6		11	
Denmark	60.0		12	
Netherlands	59.8		13	
New Zealand	54.5		14	
Australia	**50.2**	**(53.0)**	**15**	**(15)**
Belgium	49.4		16	
Ireland	45.1		17	
Greece	44.5		18	
Italy	33.2		19	
Spain	26.2		20	
Turkey	19.8		21	
Portugal	19.1		22	

POST - SECONDARY RANKING

	Profile		Profile rank	
Canada	45.8		1	
USA	32.2		2	
Norway	27.4		3	
Sweden	26.9		4	
Australia	**23.1**	**(20.1)**	**5**	**(11)**
Belgium	22.3		6	
Germany	22.1		7	
New Zealand	22.1		8	
Netherlands	21.4		9	
United Kingdom	20.9		10	
Switzerland	20.8		11	
Denmark	19.6		12	
Finland	19.4		13	
Ireland	18.5		14	
Greece	17.9		15	
France	17.4		16	
Spain	15.0		17	
Portugal	10.7		18	
Czech Republic	10.0		19	
Austria	7.7		20	
Italy	7.5		21	
Turkey	7.0		22	

DEGREE RANKING

	Profile		Profile rank	
USA	24.4		1	
Netherlands	21.4		2	
Canada	16.9		3	
Norway	16.4		4	
Denmark	13.7		5	
Sweden	13.4		6	
Australia	**13.4**	**(14.2)**	**7**	**(5)**
Germany	12.6		8	
Greece	12.1		9	
United Kingdom	11.7		10	
Spain	11.0		11	
Finland	10.9		12	
Belgium	10.1		13	
Czech Republic	10.0		14	
France	9.2		15	
Ireland	8.8		16	
New Zealand	8.8		17	
Switzerland	8.2		18	
Italy	7.5		19	
Portugal	7.2		20	
Turkey	7.0		21	
Austria	5.6		22	

Profile data from Education at a Glance - OECD Indicators 1996. These data are for the most part 1994 country data.
Profiles are lowest qualification profiles as discussed on page 16.
Australia ( ) is the adjusted profile discussed in Appendix B.

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analysed for a single year, such relationships cannot by definition hold beyond a single year [6] The qualification profile measures discussed above are used to rank countries. Country rankings are based on 1994 Age 25-64 qualification profiles, which are converted to qualification profile rank indices for each qualification category (post-compulsory, post-secondary, and degree.) The rank index converts the 1-22 country rankings to an index of 1-100, with 100 being the largest profile % (rank = 1.)

ist qualification frameworks, including the International Standard Classification of Education (ISCED) framework used by the OECD, focus on types of courses, lengths of courses, and on the perceived quality of courses. A review of the ISCED framework is currently examining the need to adjust definitions to accommodate the increasingly complex pathways and relationships between qualifications. [7]

Adjusted OECD qualification profiles for Australia

Three factors suggest that the qualification measures for Australia which have been published by the OECD require adjustment. First, the OECD 1996 profiles used original 1994 ABS measures for 1994 which were revised in 1996. Second, the measures may not be the most effective measures of the Australian situation in 1994 against the OECD framework; they appear to underestimate both the post-compulsory and degree profiles. Third, the measures for 1991 need to be adjusted to make them comparable with the 1994 measures, which are based on new and superior qualification standards introduced in 1993. These issues are reviewed in *Appendix B: Adjusted OECD Profile Measures for Australia, 1991 and 1994.*

Overall these adjustments suggest the following changes to the Australian OECD 1994 data (which appear to have been derived from the initial ABS 1994 labour force survey.)

- The post-compulsory profile increases from 50% to 53%, and the ranking remains unchanged. This adjustment assumes that 15% of ABS 'basic vocational' qualifications reach ISCED Level 3. An upper limit to the underestimate of the post-compulsory profile can be established by assuming that all 'basic vocational' qualifications reach ISCED Level 3. If this were to occur, the profile would increase to 58% and the ranking would increase from 15 to 14. However any audit of these levels could be expected to exclude significant numbers of 'basic vocational' qualifications.

- The post-secondary profile reduces from 23% to 20%, and the ranking falls from 5 to 11.

- The degree profile increases from 13.4% to 14.2%, and the ranking increases from 7 to 5.

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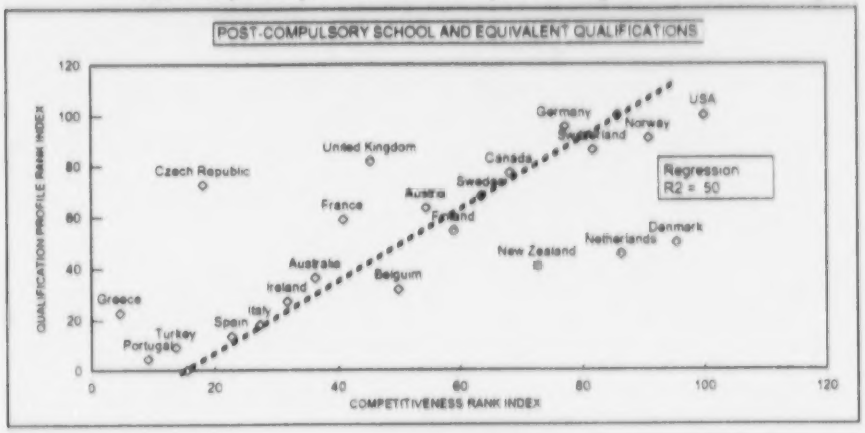
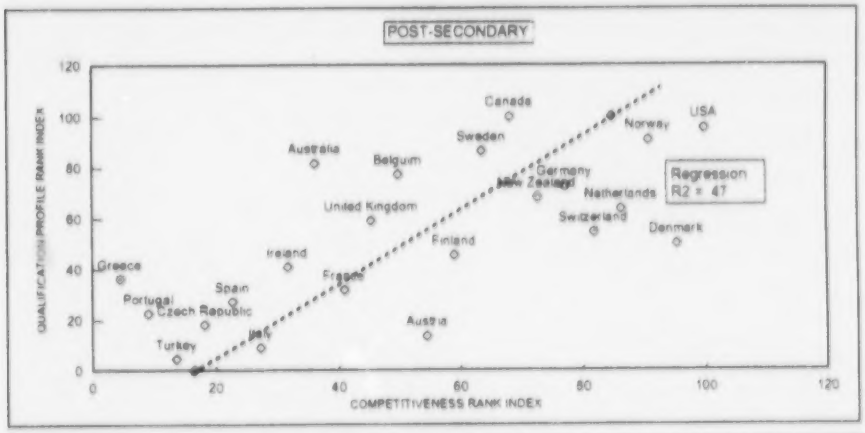
[6] See Appendix C for a discussion of further tests which were applied to these data to test for such distortions.

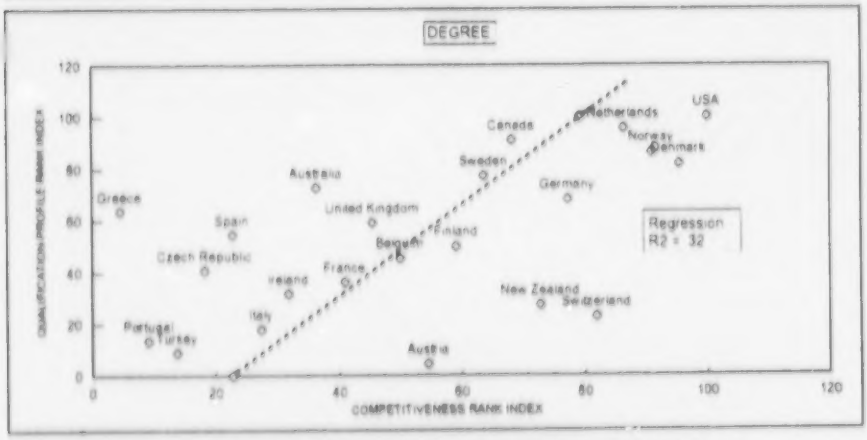
[7] Qualification standards driven by workvalue and competitiveness outcomes offer an attractive, if difficult to implement, option for future development of both national and international standards. The analysis presented in this Report suggests that there may be value in moving beyond such hierarchical relationships to examine linkages between qualification stocks and national competitiveness. *Appendix A: A Comment on the Development of Comparative Qualification Frameworks* discusses these issues further.

There is a strong correlation between country rankings based on qualification profiles and competitiveness rankings. The most significant correlation is with all post-compulsory qualifications followed by all post-secondary qualifications, followed by degrees. This suggests that development needs to be balanced across the three qualification profile measures examined.

Exhibit 3.3: Relationship Between Competitiveness Rankings and Post-compulsory, Post-secondary, and Degree Profile Rankings







Sources: Country qualification profiles: Education at a Glance - OECD Indicators 1996. Paris: OECD, 1996. Country competitiveness rankings: The World Competitiveness Yearbook 1997. Lausanne, Switzerland: IMD, 1997.
Profiles converted to rankings. Rankings converted into indices 1-100 (index = (23-ranking)/22*100).
Analysis: Performance Management Solutions, 1997.

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The relationship between qualifications stocks and competitiveness

Exhibit 3.3: Relationship between Competitiveness Rankings and Post-compulsory, Post-secondary, and Degree Profile Rankings examines relationships between competitiveness profile rankings for each of the three qualification profile categories defined above.[8]

Exhibit 3.4: Measures of the Relationship Between Qualification Profile Rankings and Competitiveness Rankings summarises three measures of the relationships which can be derived from data presented in Exhibit 3.3.

- The first is the square of the correlation coefficient obtained from a simple regression analysis of the data, which measures the degree of fit between the regression line and actual country competitiveness.
- The second is the slope of the regression line, which estimates the extent to which an increment in the profile rank index will add to the competitiveness index.
- The third is the Spearman Rank Correlation Coefficient, which measures the relationship between the two rankings.

Exhibit 3.4: Measures of the Relationship Between Qualification Profile Rankings and Competitiveness Rankings

Profile Measure	Square of the regression correlation coefficient (r2)	Slope of regression line	Spearman Rank Correlation Coefficient
Post-compulsory	0.50	0.70	0.70
Post-secondary	0.47	0.68	0.68
Degree	0.32	0.57	0.57

Exhibit 3.4 identifies a strong relationships between the rankings and suggests that the relationship is stronger for post-compulsory than for post-secondary and degree profile rankings.[9]

The simple correlations between competitiveness rankings and post-compulsory rankings shown in Exhibit 3.4 can be further strengthened by combining the three rank indices. The Qualification-Competitiveness Index discussed in Appendix C adds a proportion of the higher level profile indices, and adjusts the indices to reduce differences for the upper quartile of each

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[8] *Appendix C: Measuring the Relationship between Qualifications Stocks and National Competitiveness* discusses the methodological issues which underpin this analysis. Note that, for ranked data, the regression and rank correlation coeffcients are equal and the slope of the regression line is equal to the regression coreffcient.

[9] This result is further supported by analysis of highest qualification rankings which identifies a relationship between the country profile rankings for persons with post-compulsory qualifications who have not also gained a post-secondary or degree level qualification and competitiveness (r2 = 0.36).

data set. The resulting Index increases the square of the correlation coefficient for the regression between qualification profiles and competitiveness from 0.50, for post-compulsory alone, to 0.61; the rank correlation coefficient increases from 0.70 to 0.80. *Exhibit 3.5: The Qualification Profile-Competitiveness Index* outlines the relationship between this more complex qualifications index and competitiveness rankings. Since the post-compulsory profile includes all qualifications in the other two profiles, this result suggests a complex relationship between profile rankings and competitiveness.

Exhibit 3.6: Predicted and Actual Competitiveness presents the differences between actual competitiveness and competitiveness predicted by the Qualification-Competitiveness Index. These differences may provide a measure of the effectiveness of a country in converting profile measures into workskills and workvalue.

Four points can be drawn from this analysis.

- Measured across the 22 countries included in the OECD education data base, there is a major correlation between country rankings based on the post-compulsory qualification profiles and competitiveness rankings; the relationship appears to explain about half the differences in competitiveness between the 22 countries.[10]

- The correlation between post-compulsory rankings and competitiveness cannot be explained in terms of the final destination of some of this profile in either post-secondary or degree level qualifications. This suggests that countries which do not achieve a balanced development across the three profiles will be less competitive than countries which do. In particular, it suggests that, in the case of Australia, competitiveness impacts from successful degree level reforms (rank 5-7) may have been offset by a lack of equivalent development at the post-compulsory level (rank 15.)

- The differences between actual competitiveness and competitiveness predicted by the Qualification Profile-Competitiveness Index may provide a measure of the effectiveness of a country in converting profile measures into workskills and workvalue. Some countries (New Zealand, the Netherlands, Denmark) appear to obtain higher value from qualifications than others. Some countries (U.K., Australia, Canada) appear to obtain lower value.

- Although many factors impact on competitiveness, qualification profiles appear to explain a significant portion of the variance in competitiveness rankings between OECD countries. This suggests an important opportunity to target qualification profile development to optimise the relationship with national competitiveness.

Towards a hierarchical model of skill transition

Two ideas offer an explanation of these results. The first idea, that profiles impact on competitiveness through their capacity to differentiate between countries, focuses analysis on

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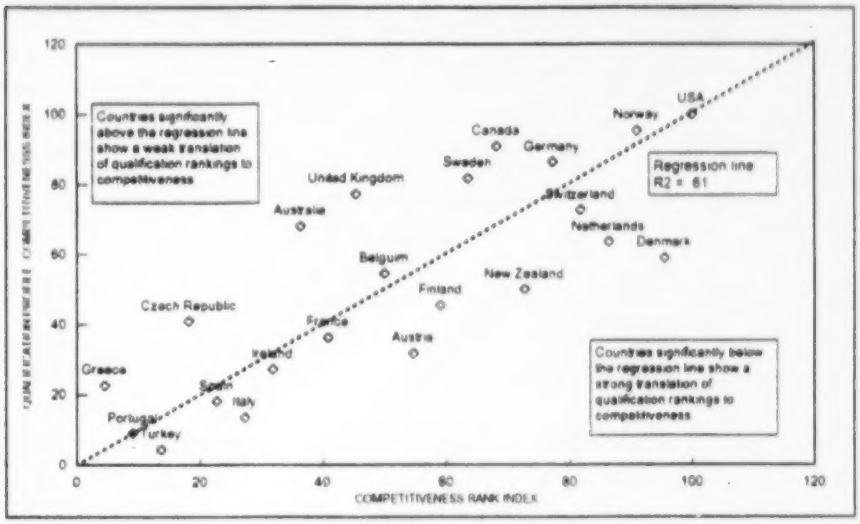
[10] This result, that the post-compulsory level relates more directly to competitiveness than higher levels of educational attainment, seems to be consistent with other studies. See U.S. Department of Education. National Center for Education Statistics. *Education and the Economy: An Indicators Report*, NCES 97-269, by Paul T. Decker, Jennifer King Rice, and Mary T. Moore. Mary R. Rollefson, Project Officer. Washington, DC: 1997, page 82.

The three qualification profile rankings can be combined into a composite rank index which appears to explain over 60% of the differences in competitiveness rankings between OECD countries. While the analysis does not suggest a simple relationship between profile rankings and competitiveness rankings, countries with a low ranking on the Qualification Profile - Competitiveness Index and a low competitiveness ranking might usefully examine strategies to improve competitiveness by increasing qualification rankings. In addition, countries positioned significantly below the regression line may have a stronger capacity to convert qualifications into competitiveness than those significantly above the line.

Exhibit 3.5: The Qualification Profile - Competitiveness Index



Sources
The Qualification Profile - Competitiveness Index is formed by weighting the post-compulsory post-secondary and degree rank indices and by reducing the differentiation for the upper quartile of each index. See Appendix C for further details.
Country competitiveness rankings: The World Competitiveness Yearbook 1997. Lausanne, Switz: IMD, 199[illegible] Copyright PMS 199[illegible]

Exhibit 3.6: Predicted and Actual Competitiveness

	Actual competitiveness Index	Rank	Predicted competitiveness Index	Rank	Actual - Predicted Index	Rank	
Czech Republic	**18.2**	**19**	**48.5**	**14**	**-30.3**	**5**	Weak translation
Greece	**4.5**	**22**	**33.5**	**18**	**-29.0**	**4**	of qualifications to
United Kingdom	**45.5**	**13**	**68.8**	**6**	**-23.4**	**7**	competitiveness
Australia	**36.4**	**15**	**57.1**	**8**	**-20.7**	**7**	or difficulties with
Canada	**68.2**	**8**	**83.8**	**3**	**-15.6**	**5**	comparative
Sweden	63.6	9	73.7	5	-10.1	4	qualification
Portugal	9.1	21	16.9	21	-7.8	0	measures
France	40.9	14	46.9	15	-6.0	-1	
Germany	77.3	6	80.7	4	-3.4	2	
Ireland	31.8	16	35.2	17	-3.4	-1	
Spain	22.7	18	25.4	19	-2.7	-1	
Belgium	50.0	12	51.6	11	-1.6	1	
Turkey	13.6	20	12.0	22	1.6	-2	
Norway	90.9	3	86.5	2	4.4	1	
USA	100.0	1	93.2	1	6.8	0	Strong translation
Finland	59.1	10	50.7	13	8.4	-3	of qualifications to
Italy	27.3	17	18.5	20	8.8	-3	competitiveness
Austria	54.5	11	40.2	16	14.3	-5	or difficulties with
Switzerland	81.8	5	66.9	7	14.9	-2	comparative
New Zealand	**72.7**	**7**	**51.3**	**12**	**21.5**	**-5**	qualification
Netherlands	**86.4**	**4**	**56.1**	**9**	**30.3**	**-5**	measures
Denmark	**95.5**	**2**	**52.3**	**10**	**43.1**	**-8**	

Qualification Profile - Competitiveness Index: See Appendix C
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Analysis: Performance Management Solutions, 1997

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rankings rather than on growth. The second idea, that the focus of that differentiation is hierarchical, focuses attention on the balance of rankings achieved by each country; this idea of balance suggests that, to be competitive, a country needs competitive rankings on each of the three qualification profiles. This is consistent with the proposition that, to exploit the technology developed by leading countries, a country requires an education and training system which is broadly comparable with the education and training system of leading countries.

The hierarchical ordering of the qualification - competitiveness weighting suggests that linkages with competitiveness may also be hierarchical.[11] In addition, analysis of profile growth across countries suggests that growth is highest where profiles are lowest, and that there is some evidence of saturation occurring in post-compulsory profiles. This suggests a model which differentiates between countries: first, on the basis of post-compulsory qualifications; second, when high levels are achieved on this measure when differentiation may shift to post-secondary stocks; and third, when high levels are achieved on post-secondary stocks when differentiation may shift to degree and higher levels.

Such a model reinforces the need for balanced profile development. This has major implications for nations seeking to optimise the translation of qualification stocks into competitiveness.

Benchmark level analysis

Exhibit 3.7: A Comparison of OECD Qualification Profiles for Benchmark Countries summarises profile estimates, from various sources, for the countries included in the detailed benchmark sample. The Singapore data are not part of the OECD data base, and have been obtained from other sources[12]. Exhibit 3.7 also includes profiles for the Age 25-34 population in each country; these provide a measure of profile growth and will be discussed in detail in Section Four.

Analysis of the OECD Age 25-64 profiles

A number of points can be drawn from an analysis of the OECD Age 25-64 data presented in Exhibit 3.7.

- The U.S. and Germany lead the post-compulsory qualification ranking, and Australia ranks fifth.
- The U.S. and Singapore lead the post-secondary rankings. Although Australia ranks second on the unadjusted post-secondary measure, the adjusted profile measure reduces Australia's ranking to sixth.
- The U.S. leads in the degree ranking and Australia ranks second on this measure.

Analysis of the OECD Age 25-34 profiles

While the Age 25-34 rankings produce generally similar profile ranks, differences between the

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[11] See Appendix C for discussion of the nature of these relationships.

[12] Assessment, Qualifications and Standards: the UK Compared to France, Germany Singapore and the U.S.: A Technical Report, by Hilary Steedman et al. London: The Centre for Economic Performance, LSE, 1997. Chapter 3. SINGAPORE by Andy Green.

The extent of weakness in the post-compulsory profile for Australia is highlighted by an examination of profiles of selected benchmark countries. Australia ranks fifth on the post-compulsory profile for the Age 25-64 profile and last on the Age 25-34 profile.

Exhibit 3.7 : A Comparison of OECD Qualification Profiles for Benchmark Countries

	U.S.	Singapore	Germany	New Zealand	U.K.	Australia modified	Australia OECD
COMPETITIVENESS RANKING	**1.0** 1.0	**2.0** 2.0	**14.0** 5.0	**13.0** 3.0	**11.0** 4.0	**18.0** 6.0	
OECD Qualification profiles (% of Age 25-64 population)							
Profiles							
Post-compulsory	85.1	48.0	84.0	54.5	74.3	*53.0*	*50.2*
Post-secondary	32.2	21.5	22.1	22.1	20.9	*20.1*	*23.1*
Degree	24.4	8.8	12.6	8.8	11.7	*14.2*	*13.4*
Rankings							
Post-compulsory	1.0	6.0	2.0	4.0	3.0	*5.0*	*5.0*
Post-secondary	1.0	4.0	2.0	3.0	5.0	*6.0*	*2.0*
Degree	1.0	6.0	3.0	5.0	4.0	*2.0*	*2.0*
Qualification rank index	**0.9**	**4.8**	**1.9**	**3.4**	**3.6**	***4.8***	*3.4*
Rank by index	*1.0*	*5.5*	*2.0*	*3.0*	*4.0*	*5.5*	*3.5*
OECD Qualification profiles (% of Age 25-34 population)							
Profiles							
Post-compulsory	86.4	66.8	89.6	59.3	85.8	57.1	54.3
Post-secondary	32.0	34.7	20.3	20.3	23.0	20.6	23.6
Degree	23.4	14.3	11.9	9.6	13.6	15.5	14.7
Rankings							
Post-compulsory	2.0	4.0	1.0	5.0	3.0	6.0	*6.0*
Post-secondary	2.0	1.0	5.5	5.5	3.0	4.0	*2.0*
Degree	1.0	3.0	5.0	6.0	4.0	2.0	*2.0*
Qualification rank index	**1.8**	**2.6**	**2.8**	**4.9**	**2.9**	**4.6**	**3.9**
Rank by index	*1.0*	*2.0*	*3.0*	*6.0*	*4.0*	*5.0*	*5.0*
Qualification - competitiveness translation measure from Exhibit 3.3	*0.0*	*>+5*	*2*	*5*	*-7*	*-7*	
Rank by index	*4.0*	*1.5*	*3.0*	*1.5*	*5.5*	*5.5*	

The Age 25-34 profile for Singapore is the Age 25-29 profile. This illustrates the rate of profile growth being achieved by that nation. (The actual Age 25-34 profiles for Singapore are 64%, 30%, and 12.7%)

Education at a Glance - OECD Indicators 1996, including unpublished data for the Age 25-34 populations

Singapore data from Assessment, Qualifications and Standards: The UK Compared to France, Germany, Singapore and the U.S.: A Technical Report, by Hilary Steedman et al. London: The Centre for Economic Performance, LSE, 1997

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regex37

Age 25-34 rankings and the Age 25-64 rankings provide a measure of future shifts in rankings. Measures of future profile growth are discussed in more detail in Section Four. A comparison of the Age 25-34 rankings with the Age 25-64 rankings identifies the following differences:

- The U.S. holds its degree ranking but reduces to second place in both the post-compulsory (to Germany) and the post-secondary (to Singapore.)

- Singapore improves its post-compulsory ranking by two, and its post-secondary and degree rankings by three, suggesting a strong long-term Age 25-64 ranking for this country.

- Germany strengthens its post-compulsory ranking, but the rankings for post-secondary and degree reduce, suggesting that growth in degree qualifications in that country needs to increase.

- New Zealand reduces rankings marginally for each profile measure.

- The U.K. holds its post-compulsory and degree rankings, and increases its post-secondary ranking.

- Australia drops to last place on the post-compulsory rankings, improves two ranks to fourth on the post-secondary ranking, and maintains second ranking on degrees (using the adjusted figures.)

The Qualification Profile - Competitiveness Index

Exhibit 3.6 presents the difference between the competitiveness predicted by the Index rankings and actual competitiveness, and suggests that this difference may be a measure of the capacity of different systems to translate education and training outcomes into competitiveness. Measures for the benchmark countries are included in Exhibit 3.7. Singapore and New Zealand rank highest on the translation measure, and Australia and the U.K. rank lowest.

In the case of Singapore, the higher Age 25-34 profile and the targeting of workskill development may explain the strength of the translation. Weaknesses in the translation of qualifications into competitiveness in the U.K. and Australia may relate to issues of profile balance; both countries have reformed their university systems without creating a strong vocational stream at the upper secondary level.

Analysis of the U.K. Skills Audit Profiles

In 1996 the U.K. government commissioned research and prepared an audit of U.K. workskills against those of Germany, the U.S., France, and Singapore.[13] The Audit concluded that the U.K. skill base was not uncompetitive and that a number of recent developments were likely to assist the U.K. to improve its position. An important development is the planned expansion of General National Vocational Qualifications designed to combine general and vocational skills and to provide a major alternative to the General Certificate of Education.

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[13] The Skills Audit. A Report from an Interdepartmental Group. London: Department for Education and Employment and Cabinet Office, Office of Public Service, 1996.

While on balance the Audit may have underemphasised the links with competitiveness, undervalued the U.S. skill base, and overvalued some aspects of the U.K. skills base, the Audit is a valuable exercise in international benchmarking which can be used to identify key issues which most countries need to address.

Exhibit 3.8: A Comparison of OECD and U.K. Skills Audit Profile Rankings compares the U.K. results with the OECD results presented in Exhibit 3.7. In this, data for Australia and New Zealand have been estimated from OECD and ABS sources. Profiles are ranked, and the Index discussed in Exhibit 3.5 is calculated and used to provide an overall country ranking.

The U.K. Skills Audit attempts to adjust OECD profiles to provide measures of equivalent academic standards. Competitiveness correlations are more difficult to explore because of the small size of the sample. Generally the correlation with the U.K. profile rank measures is weaker than it is with the OECD profile measures; however the profiles still explain about 37% of competitiveness rank differences between the six countries, with the major weighting being post-compulsory A.

Exhibit 3.8 compares rankings of the benchmark countries using the OECD and Skills Audit profile measures. Three points can be drawn from the comparison.

- First, although a rigorous examination of standards is likely to reduce profiles, the impact on rankings is more complex to evaluate. Mass post-compulsory education is likely to alter minimum standards, and to allow a greater range of standards in a number of countries.

- Second, the most significant shifts are a decrease in the U.S. ranking, and an increase in the rankings for Singapore and Germany.

- Third, these results suggest that links between education standards and workvalue require further exploration.[14] Links between academic evaluations and competitiveness are difficult to find in these data. This suggests that academic standards are only one factor which might add value to an individual in the workplace. Socialisation may assist individuals to manage the transition from school to work. Academic standards measure academic outcomes, which may not equate with the capacity to learn somewhat different skills in the workplace.

The balance of vocational and general skills between countries

A number of studies have sought to distinguish between vocational and general education skills. Steedman and Green suggest that there is a 'hollowing out' in the U.K. skills profile, with large numbers remaining at low skill levels[15]. They attribute this, in part, to the lack of labour market rewards for intermediate skills and to a lack of programs, particularly vocational

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[14] For example, workvalue relates to the value derived by business from persons with particular qualifications, rather than the skills possessed by those completing qualifications.

[15] Into the Twenty First Century: An Assessment of British Skill Profiles and Prospects [by] Andy Green and Hilary Steedman. London: Centre for Economic Performance, LSE, 1997.

The U.K. Skills Audit suggests that an examination of qualification standards decreases the relative position of the U.S., and increases the German and Singapore rankings. Australian rankings alter only slightly using this approach.

Exhibit 3.8 : A Comparison of OECD and U.K. Skills Audit Profile Rankings

	U.S.	Singapore	Germany	New Zealand	U.K.	Australia modified
COMPETITIVENESS RANKING						
All 22 OECD countries	**1.0**	**2.0**	**14.0**	**13.0**	**11.0**	**18.0**
6 benchmark countries	1.0	2.0	5.0	3.0	4.0	6.0
U.K. Skills Audit Profiles (% of population)						
Profiles						
Level 2- Post compulsory A	50.0	51.0	70.0	43.6	44.7	42.4
Level 3 -Post-compulsory B	21.8	3.0	62.0	20.3	29.8	18.5
Level 4 and above - Post-secondary	21.8	12.0	15.0	12.4	18.9	17.8
Rankings						
Level 2- Post compulsory A	3.0	2.0	1.0	4.0	5.0	6.0
Level 3 -Post-compulsory B	4.0	3.0	1.0	5.5	2.0	5.5
Level 4 and above - Post-secondary	1.0	6.0	4.0	5.0	2.0	3.0
Qualification profile index	**3.0**	**2.5**	**1.1**	**4.3**	**3.4**	**5.2**
Rank by index	*3.0*	*2.0*	*1.0*	*5.0*	*4.0*	*6.0*
U.K. Skills Audit ranking less OECD profile ranking						
Level 2- Post compulsory A	-1	1	1	-1	0	0
Level 3 -Post-compulsory B	-3	2	1	-1.5	1	0.5
Level 4 and above - Post-secondary	0	-4	0	0	4	0
Qualification profile index	**-2.1**	**1.1**	**1.6**	**-0.1**	**0.6**	**1**
Rank by index	-2	1	1	0	0	0

Australia and New Zealand estimates

Post-compulsory A = 0.8 x OECD profile to reflect more rigorous pass criteria for end of school.

Post-compulsory B = 0.92*OECD post-secondary profile to reflect higher standards applied to some associate diploma and similar qualifications.

Post secondary = degree plus diplomas. New Zealand diploma component estimated on the basis of Australian levels. (ABS 1996 survey measures diploma, excluding education profile, at 3.6%)

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programs, as an alternative to degrees. The U.K. Skills Audit identifies the need to expand the General National Vocational Qualifications to provide a strong vocational stream at the post-compulsory schooling level although it seems to conclude that the gap with actual skill levels is less apparent [16]

Sweet argues that the proportion of education and training places in the immediate post-compulsory education and training system in Australia is well below the OECD average [17] Although adjustments to recent OECD data to include all TAFE places appear to redress this problem, many of the additional places do not appear to lead to post-compulsory qualifications which would be recognised in the OECD framework, and some have no link at all with workskills.

Exhibit 3.9: The Balance of General and Vocational Skills presents tentative divisions of the profiles for the U.K., Germany, U.S., and Australia into 'vocational' and 'general'. Although this is a very preliminary analysis, it suggests that further work to compare the split of vocational and general skills in different countries would add to an understanding of linkages between qualification profiles and competitiveness. For Australia, these data suggest that a major priority of training reform should be to expand the supply of vocational skills at the OECD Level 3 standard.

Other international comparisons of skills

Other important international skill comparisons, which will have an important impact on all studies of national skill differences, are now being developed. Assessments generated by international tests for literacy, science and mathematical skills can be expected to generate additional insights into the standards issues raised by Steedman and Green. Already there appear to be wide differences in school systems, and data suggest that skill gaps at the end of school tend to continue through subsequent qualifications.

Recent OECD comparisons for each of the benchmark countries are included as *Exhibit 3.10: International Skill Comparisons*. They tend to confirm the strength of school development in Singapore and the quality problems evident in the U.S. system. The Australian results suggest that skill levels are competitive, at least at the younger age levels in schools.

Industry level analysis

Detailed analysis of industry employment qualification profiles in Australia has been undertaken, and six industry case studies have been completed. This work has identified major differences between industries, in both the qualification profiles they currently utilise and in the

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[16] Assessment, Qualifications and Standards. The UK Compared to France, Germany, Singapore and the U.S.: A Technical Report, by Steedman et al. London: The Centre for Economic Performance, LSE, 1997.

[17] Richard Sweet, "Forging New Connections to the Workplace," in The Australian TAFE Teacher, Fourth Quarter, 1994, page 50, and also

Richard Sweet, "Learning a Living - Looking Into Education's Black Box ," in Education in the 1990's Competencies, Credentialism, Competitiveness? Papers presented at an Office of EPAC Seminar held in Canberra on 7 July 1992. Canberra: EPAC, 1992, pp. 85-96. (Background Paper No. 21)

While comparative data on vocational qualifications stocks and enrolments are limited, those that are available suggest that Australia has a relatively low proportion of vocational to total qualifications, measured within the OECD framework. This suggests that any expansion of post-compulsory qualifications in Australia should include a strategic expansion in vocational programs.

Exhibit 3.9: The Balance of General and Vocational Skills

	U.S.	Singapore	New Zealand	Germany	U.K.	Australia	OECD Avg.
Proportion of post-compulsory enrolments							
Vocational			32.0	77.5	57.7	59.9	53
General			68.0	22.5	42.3	40.1	47
Total			100.0	100.0	100.0	100.0	100
Qualifications UK Level 2 and above total population							
Vocational				51.0	22.0	20.0	
General				20.0	24.0	22.4	
Total	50.0	51.0	43.6	70.0	45.0	42.4	

Proportion of enrolments: Education at a Glance - OECD Indicators 1996,Table P3.2. The Australian vocational proportion increased from 24.9% in 1995 to 59.9% in 1996, due to the inclusion of TAFE enrolments which may have overstated the proportion compared to other countries.

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U.K. Level 2 Qualifications: UK Skills Audit, Figure 5.2.
Australia: ABS 1996, 'skilled vocational' plus 'associate diploma.'

While reliable comparitive data on basic skills between countries are only now becoming available, those that are available suggest that there are major differences between systems. The impact on workskills needs to be monitored as part of any ongoing country benchmarking project.

Exhibit 3.10: International Skill Comparisons

	U.S.	Singapore	New Zealand	Germany	U.K.	Australia
Literacy A	535.3	534.0	545.0	524.0		
Literacy B	51.5			54.5		
Mathematics	500.0	643.0	508.0	509.0	506.0	530.0
Science	534.0	607.0	525.0	531.0	552.0	545.0
Multinational companies						
New entrants						
Literacy	23.0	28.0		28.0	23.0	
Numeracy	22.0	36.0		33.0	22.0	
Adults						
Literacy	23.0	30.0		28.0	22.0	
Numeracy	21.0	30.0		31.0	21.0	
World Competitiveness Yearbook questionnaire rankings						
Is skilled labor easy or hard to employ?	6.1	5.1	5.1	6.9	5.6	6.2
Is compulsory education superior to foreign competitors?	4.0	7.7	6.6	7.4	4.1	7.1
Does the education system meet the needs of a competitive economy?	4.0	7.8	5.6	5.7	3.7	6.1

Literacy A: 'Education and the Economy,' op. cit., page 87, Figure 8.6 - average value.
Literacy B: ' UK Skills Audit' op.cit., page 26, Figure 4.2 - Prose + Documentary Levels 3-5.

Mathemantic and Science: U.S. Department of Education. National Center for Education Statistics, "Pursuing Excellence," NCES 97-198, by Lois Peak. Washington, DC: U.S. Government Printing Office, 1996. Initial Findings From the Third International Mathematics and Science Study, "A Study of U.S. Eighth-Grade Mathematics and Science Teaching, Learning, Curriculum, and Achievement in International Context." Note that the Australian results are qualified as not meeting international guidelines.

Multinational companies: UK Skills Audit, op.cit., page 25, Figure 4.1.

World Competitiveness Yearbook 1995, op.cit., Factors 8.15, 8.28, 8.34.
Highest score equates to affirmative response in each case.

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future workskill priorities required to be competitive [18]

The differences suggest that comparison of profiles also needs to consider differences in the industry mix between countries. Countries with a major focus on agriculture or mining will require different qualification priorities from countries with highly developed service industries and technology-driven growth.

International data on industry profiles require further analysis to explore whether differences reflect supply-side differences between countries, different industry needs, or different industry competitiveness.

SUMMARY

An analysis of the OECD qualification profiles against The World Competitiveness Yearbook 1997 competitiveness rankings suggests that there is a strong relationship between the ranking of countries on the basis of stocks of qualifications and competitiveness. The relationship explains over half the differences in competitiveness between countries in 1997. The relationship appears to be hierarchical, differentiating between countries first on the basis of all post-compulsory qualifications, then on the basis of all post-secondary qualifications, and finally on the basis of degree level qualifications.

This analysis has important implications for education and training reform in Australia.

- Although Australia ranks 5 for degrees and 11 for post-secondary, its ranking for 'all post-compulsory' qualifications reduces to 15.

- The most significant qualification profile for explaining differences in competitiveness between OECD countries is 'all post-compulsory' qualifications. This suggests that countries which expand university and other higher level post-secondary qualifications without expanding the post-compulsory school and equivalent VET programs at the lower end of the profile will prove to be less competitive than countries that achieve a balanced expansion. In Australia, the non post-secondary part of the post-compulsory profile is delivered by schools and the VET system. Schools includes those completing Year 12. VET includes all skilled vocational programs, including apprenticeships and equivalent programs.

- The imbalance in the Australian qualification rankings suggests that the competitive position delivered to Australia by its degree level ranking may be offset by the failure to achieve a more competitive post-compulsory ranking. Three strategies are suggested to remove this constraint: first, to increase the efficiency of the workskill development process by strengthening industry/enterprise - based training, second, to target qualifications which will increase the relevance of qualifications to the future needs of key industries, and third, to expand the long-term supply of qualifications into the Australian workforce at the post-compulsory level.

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[18] See An Analysis of the Qualification Profiles in Australian Industry: Agriculture Forestry and Fishing, Manufacturing, Food Beverages and Tobacco, Finance Property and Business Services, Communications, Wholesale and Retail Trade, and Health and Community Services, by R.B.Cullen. Brisbane: ANTA, 1995 -1996.

One priority for education and training reform needs to be to audit this gap at the post-compulsory level against the standards delivered by other countries, and to develop programs to improve Australia's national ranking at the post-compulsory level. In seeking to expand its post-compulsory qualifications and increase its ranking, Australia needs to expand vocational programs which meet the ISCED Level 3 standard, as well as addressing the needs of adults who have entered the workforce with lower level qualifications to upgrade those qualifications where they can add to industry performance.

SECTION FOUR: FUTURE COMPETITIVENESS

To ensure future competitiveness, Australia's qualification profile must grow at least as rapidly as that of its competitors. Yet over the period 1991 - 1994 Australian qualification profiles grew less rapidly than the OECD average. With the possible exception of the degree profile, this analysis suggests that:

- *over the period 1991 - 1994, Australian profile growth lagged behind that of comparable countries; and,*

- *unless action is taken to correct current trends, the situation is likely to deteriorate in the future.*

Section Two discussed the measurement of national competitiveness and differences between countries. Section Three explored relationships between the ranking of nations on the basis of qualification profiles and national competitiveness, and identified opportunities to improve competitiveness by altering the levels and balance of qualification stocks.

However, opportunities to gain competitive advantage suggested by this analysis can only be exploited if a country is able to improve its ranking. Benchmarking future improvements in competitiveness requires an analysis of future qualification profile projections for different countries. This Section examines past and future shifts in qualification profiles for Australia and for other countries.

Comparative growth measures

Two approaches to benchmarking future growth are considered:

- First, Profile Age Gap analysis compares the gap between the Age 25-34 profile and the Age 25-64 profile. This gap is a lead indicator for overall profile growth. The strength of this analysis is that it avoids problems created by changes in classifications over time. The weakness is that, while the age gap determines the majority of future growth, it is only a partial measure.

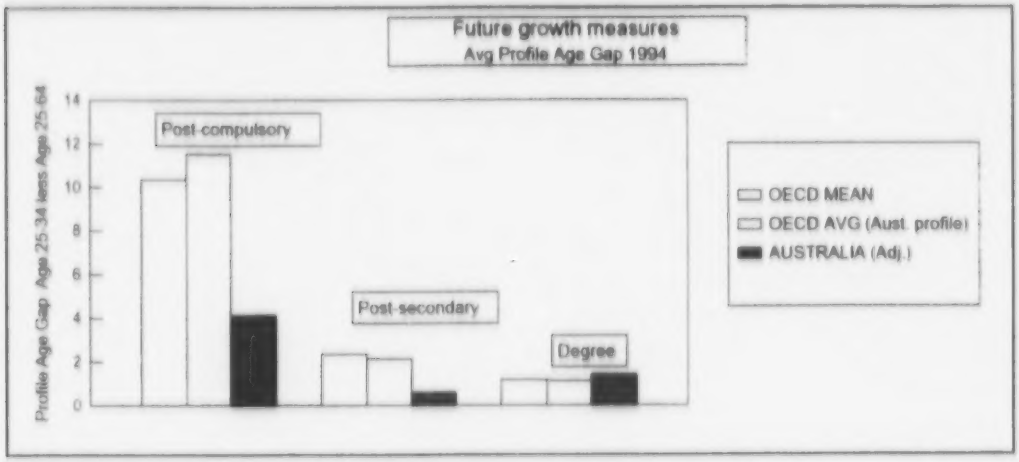
- Second, historical growth between 1991 and 1994 is evaluated. There are two problems with this type of growth analysis, that historical growth may not reflect future growth, and that country applications of the standard qualification framework to a particular country's needs may alter over time.

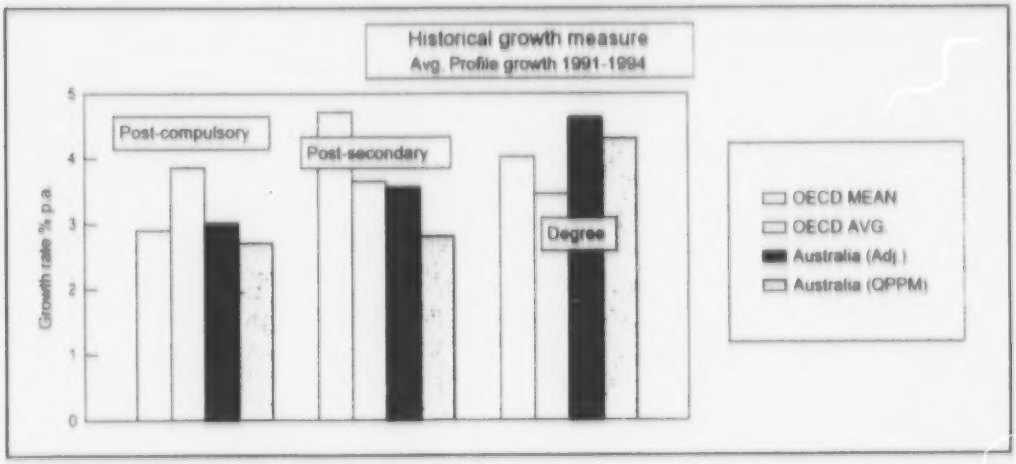
An overview of corrected Australian growth measures and a comparison with OECD averages is presented in *Exhibit 4.1: Australian Qualification Profile Growth Compared with OECD Averages*. Two measures of average OECD growth and Profile Age Gaps are included in Exhibit 4.1. The first is a mean of all OECD countries[19]. The second is an average

[19] In the case of the degree mean, a number of countries were omitted on the grounds that their 1991 and 1994 data did not appear to be comparable. For example, the Netherlands recorded a very high growth rate over the period, and a number of countries recorded negative growth; however, an examination of Profile Age Gaps suggests that the degree profile for these countries is actually growing.

To ensure future competitiveness, Australia's Qualification Profiles need to grow at least as rapidly as those of key competitors. Yet over the period 1991-1994, Australia's profile grew less rapidly than the OECD average. An analysis of Profile Age Gaps suggests that, unless action is taken to match the growth of other nations, the position of Australia is likely to decline.

Exhibit 4.1: Australian Qualification Profile Growth Compared with OECD Averages





Sources

Background data from Exhibit 4.2 and Exhibit 4.3.

Australian adjusted growth estimates are detailed in Appendix B.

Australia QPPM estimates are from the Qualification Profile Projection Model which has linked the two ABS data series.

Analysis

OECD average growth and average Profile Age Gap are forecast as a function of each qualification profile rank index. Comparisons with Australia use the average OECD index measured at the Australian qualification profile rank index.

Comment

Historical growth comparisons should be treated with caution because data may not be comparable. See Note to Exhibit 4.2 for a discussion of adjustments to the degree averages which attempt to overcome this problem. The Profile Age Gap analysis is independent of these factors but does not measure all growth factors. The regression is far stronger for post-compulsory growth and Profile Age Gaps than for other levels where the impact is minor.

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growth trend calculated from a regression which forecasts growth as a function of each qualification profile rank index. The hierarchical model outlined in Section Three is one way of explaining the relationship between profile rankings and competitiveness rankings; it suggests that, particularly for the post-compulsory profile, growth will decrease as higher profile levels are achieved. The growth data appear to show such a relationship, particularly for the post-compulsory profile. The OECD average provides a measure of the growth required in the Australian profile if it is to match the growth of competitors. The OECD average measure used in this analysis is the average OECD growth expressed as a function of each country's qualification profile. The average growth which is relevant for Australia is the average OECD growth line, measured at Australia's profile level.

With the possible exception of the degree profile, this analysis suggests that Australian growth has lagged behind that of comparable countries and that, unless action is taken to correct current trends, the situation is likely to deteriorate in the future.

The discontinuity in Australian profile measures between 1991 and 1994

Before comparing historical growth rates, it is necessary to remove a major discontinuity in the reported Australian profiles between 1991 and 1994. The Australian qualification profile reported by the OECD declined between 1991 and 1994, a result caused by a major discontinuity in the Australian data in 1993. A new classification system, introduced in 1993, encountered a number of initial problems [20] Data for 1994 were substantially revised by the Australian Bureau of Statistics in 1996, and the revised classification system can now be used to measure the OECD qualification levels more accurately than was possible in 1991.

Appendix B adjusts the published OECD profiles to produce comparable data for 1991 and 1994. The adjusted estimates, used in the following analysis, suggest that Australian profiles grew between 1991 and 1994. Two growth measures are developed in Appendix B: first, a measure derived by adjusting the OECD profile data using ABS surveys for 1991 and 1994, and second, a measure derived from the Qualification Profile Projection Model (QPPM) developed by Performance Management Solutions for the Australian National Training Authority. This model is based on analysis of a decade of ABS data, and the 1993 discontinuities have been analysed and bridged. While the QPPM derives profile measures for the workforce rather than for the Age 25-64 population, growth rates derived from the QPPM should also apply to the Age 25-64 population profiles [21]

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[20] In 1993, new ABS categories of qualifications replaced the historical framework which had evolved to measure qualifications. The new system measured postgraduate, degree, undergraduate diploma, associate diploma, skilled vocational, basic vocational qualifications, and school Year 12 completions. The previous system provided far less detail for non degree qualifications; it measured degrees, trade qualifications, diploma and certificate qualifications and school completions.

[21] Industry Qualification Profile and Demand Projection 1993-2005: A Qualification Profile Projection Model for the Australian Workforce. A Report prepared by Performance Management Solutions for the Australian National Training Authority, by R.B. Cullen, June 1996, and also
Planning for Improvement in the Skills Base and Qualification Profiles Level of the Queensland Workforce. A Report prepared by Performance Management Solutions for the Queensland Commission of Audit, by R. B. Cullen. June 1996.

Future and historical growth for the post-compulsory, post-secondary and degree profiles of OECD countries

Exhibit 4.2: Future Profile Growth and Competitiveness: Profile Age Gaps for OECD Countries uses the Profile Age Gap between the Age 25-34 profile and the Age 25-64 profile to compare the future growth of profiles in different countries. *Exhibit 4.3: Profile Growth 1991-1994 and Competitiveness: Average for OECD Countries* analyses the shifts in profiles between 1991 and 1994.

Post-compulsory growth

As discussed, to eliminate a number of discontinuities, the Australian growth rate has been adjusted from the - 4.3%, which results from the published OECD data, to + 3%, which results from adjustments to those data.[22]

Three points can be derived from the analysis

- Exhibit 4.2 identifies a major gap between the post-compulsory profile for younger and older persons. This suggests that growth in this profile will accelerate in the future. The average Qualification Profile Age Gap is 11.5 % for countries at Australia's profile level. The Australian gap is 4.1%. The size of the average age gap and the low age gap measured for Australia suggest that future growth in the post-compulsory profiles of many countries will threaten Australia's post-compulsory ranking.

- Australia has a relatively low ranking for the post-compulsory profile, and the comparative analysis suggests that Australia is likely to be overtaken by a number of countries, for example, Ireland and Belgium and possibly Italy, over the next few years. Although Australia has increased school retention rates and is generating growth in this profile, its overall ranking seems likely to deteriorate unless action is taken to bridge the growing Profile Age Gap at the post-compulsory level.

- An analysis of historical growth is presented in Exhibit 4.3. It suggests that the average OECD growth over the period 1991-1994 was 3.9% p.a. for nations at Australia's profile level. The estimated growth for Australia was 2.7% - 3.0%.

Post-secondary growth

Australia is slightly better placed in the post-secondary rankings, although the adjusted profile reduces the post-secondary ranking from 5 to 11. The Australian growth rate has been adjusted from the -9.5% which results from the published OECD data, to +3.6%, which results from adjustments to these data to eliminate a number of discontinuities.

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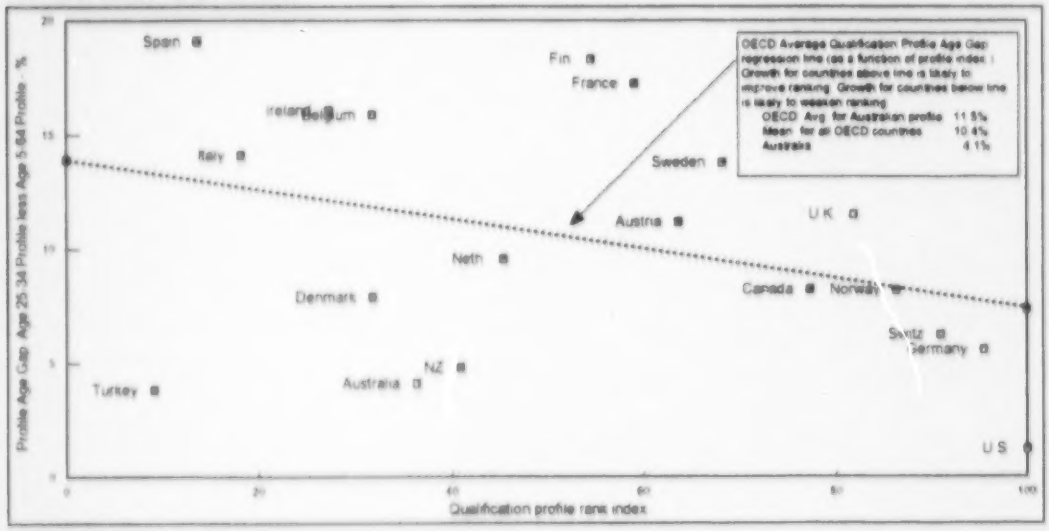
[22]This relationship is entirely compatible with the hierarchical theory of competitiveness linkages proposed in Section 3.

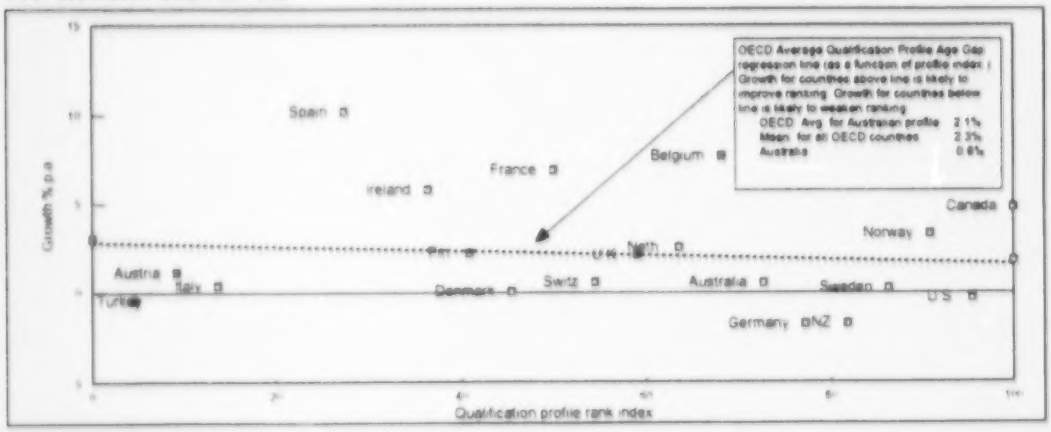
A key measure of whether a country is moving forwards or backwards relative to others can be derived from the difference between the Age 25-34 and the Age 25-64 qualification profiles. This provides a partial measure of future profiles. For Australia, the prognosis is for lower than average growth, except possibly for degrees.

Exhibit 4.2: Future Profile Growth and Competitiveness: Profile Age Gaps for OECD Countries

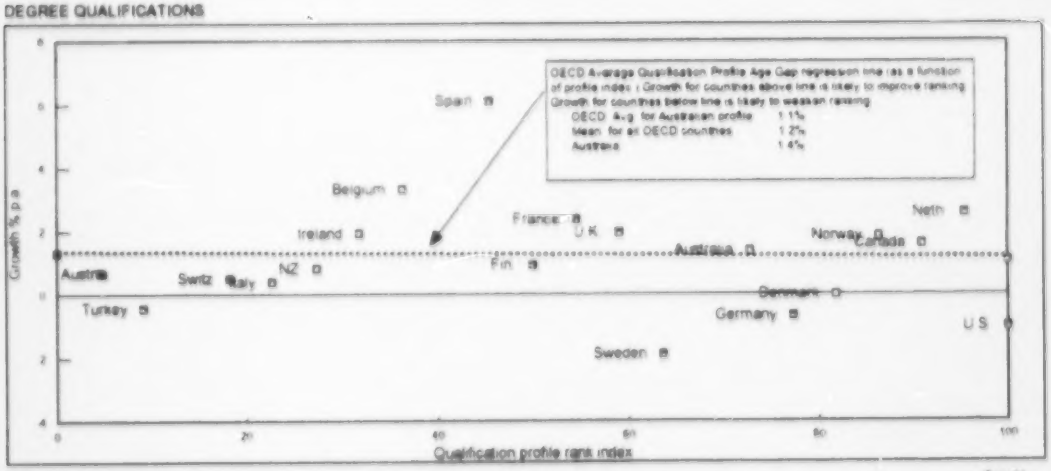
POST-COMPULSORY QUALIFICATIONS



POST-SECONDARY QUALIFICATIONS



DEGREE QUALIFICATIONS



Profile Age Gap is the difference between the Age 25-34 and the Age 25-64 profiles in 1994 for the countries analysed in Exhibit 4.1. The profile for Australia is the OECD profile, since longitudinal problems are unlikely to have a major impact on the Profile Age Gap.

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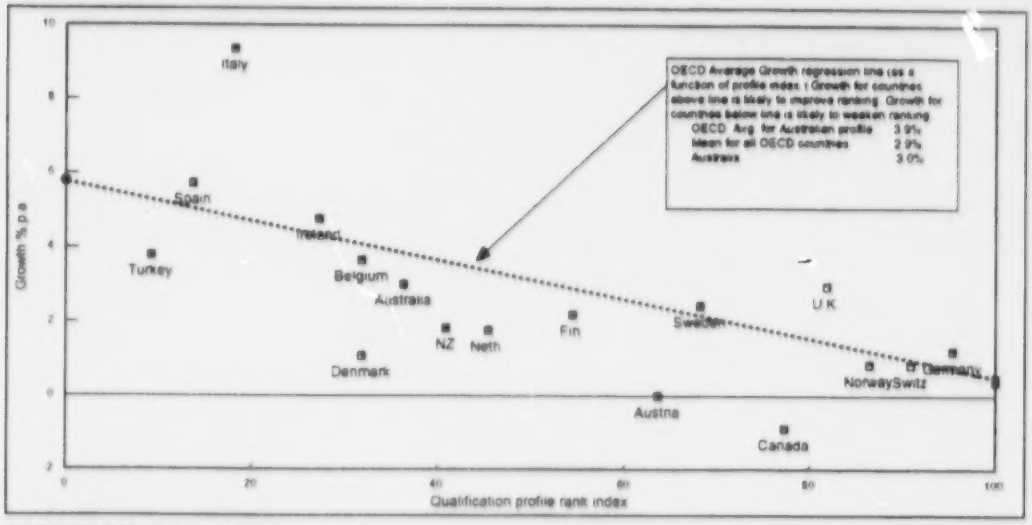
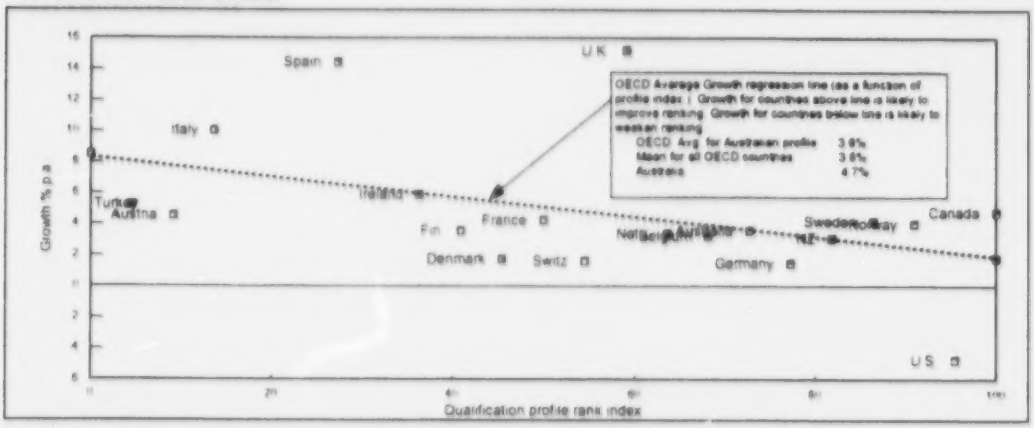
Profile growth alone will not necessarily improve a country's ranking. A comparison of average profile growth 1991-1994 against competitiveness shows that most countries have increased profiles. But to increase profile ranking a country must grow faster than other countries of similar rank, and a number of countries, including Australia, have failed to achieve this.

Exhibit 4.3: Profile Growth 1991-1994 and Competitiveness: Average for OECD Countries

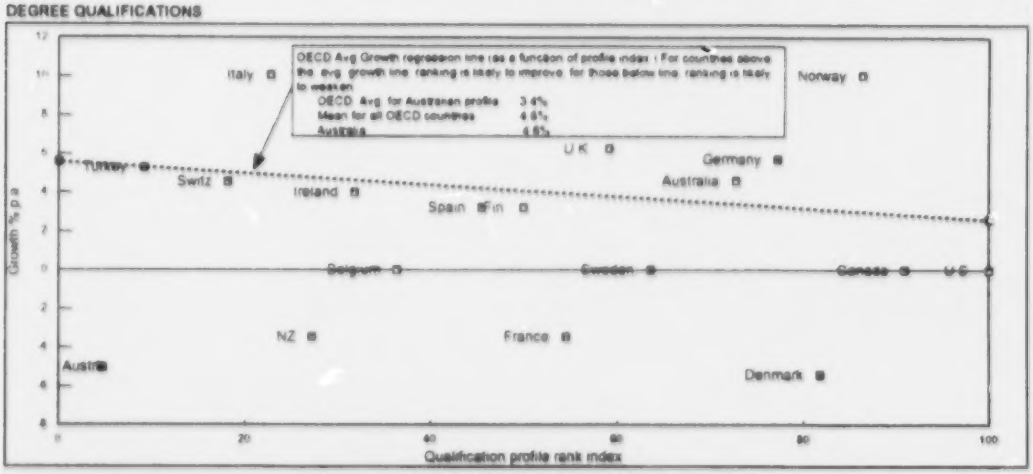
POST-COMPULSORY QUALIFICATIONS



POST-SECONDARY QUALIFICATIONS



DEGREE QUALIFICATIONS



Growth is the average growth 1991-1994 for OECD countries reported on both data sets. Profiles for Australia are the adjusted estimates discussed in Appendix C. Data for degrees do not appear to be comparable between 1991 and 1994 for a number of countries. Degree regression excludes countries with negative growth and also the Netherlands where 1991 and 1994 data do not appear to be comparable.

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Three points can be derived from this analysis

- Qualification Profile Age Gap comparisons are presented in Exhibit 4.2. The average Age Gap for OECD countries at Australia's overall competitiveness level is 2.1% p.a., compared with an estimated Age Gap for Australia of 0.5%.

- Although Australia has a higher ranking for the post-secondary profile (adjusted ranking = 11) the comparative analysis suggests that Australia's post-secondary ranking may also weaken over time.

- An analysis of historical growth is presented in Exhibit 4.3. It suggests that the average OECD growth over the period 1991-1994 was 3.6% p.a. for nations at Australia's profile level. The estimated growth for Australia was 2.8% - 3.6%.

Degree growth

The degree profile is a source of competitive advantage for Australia. The adjusted profile increases Australia's ranking from 7 to 5, and decreases the 1991-1994 growth rate from 10.2% to 4.6%. The increase in ranking is due to the inclusion of teachers with diploma qualifications in the degree profile. The reduction in growth is due to an adjustment to include all professional nurses and teachers in the degree data for 1991 (nurses with non degree qualifications are included in the 1994 degree data, and excluded from the 1991 degree data published by OECD.)

Three points can be derived from this analysis.

- Australia's Qualification Profile Age Gap of 1.4% reflects the result of a decade of higher education and training reform in Australia which appears to have created both profile growth and a source of competitive advantage. However, the average Age Gap for OECD countries with a similar profile level is 1.1% and the adjusted mean across all OECD countries is estimated to be 4%. These measures suggest that the Age Gap difference between Australia and other countries is closing. Strong future growth in the degree profiles of many OECD countries, including Australia, can be expected over the next few years. While Australia may be able to retain its OECD ranking, it is already being overtaken by other benchmark countries such as Singapore, and could lose OECD ranking unless current education and training outputs are maintained.

- The average profile growth for countries at Australia's overall competitiveness level is estimated to be 3.4% p.a., compared with an estimated growth rate for Australia of 4.3% - 4.6% p.a. Growth rate comparisons for degree level profiles are the least reliable, particularly for Australia where a number of major statistical changes have occurred, making any estimate of growth uncertain.

Benchmark level analysis

Exhibit 4.4: Growth Measures for Each Benchmark Country summarises the growth measures analysed in Exhibits 4.2 and 4.3.

Estimates for Singapore are included. The large Profile Age Gap for Singapore highlights

The Profile Age Gap measure of future profile growth confirms the challenge facing Australia. Australia ranks fifth among the six benchmark countries for post-compulsory profile growth, third for post-secondary growth, and third for degree growth. The inclusion of Profile Age Gap data for Singapore shows that this nation will experience by far the highest future growth in each of the qualification categories. The next highest growth for post-compulsory is likely to be the U.K., and the lowest growth is forecast for the U.S. which has already attained a very high profile at this level. The next highest growth in the post-secondary profile is likely to be Germany, and the lowest growth in this category is likely to be the U.K. After Singapore, the next highest growth for the degree profile is likely to be the U.K., and the lowest growth is expected from the U.S.

Exhibit 4.4: Growth Measures for Each Benchmark Country

BENCHMARK COUNTRIES	POST - COMPULSORY Avg. Profile Growth 1991-1994			AGE GAP Age 25-34 less Age 25-64 Profile	POST - SECONDARY Avg. Profile Growth 1991-1994			AGE GAP Age 25-34 less Age 25-64 Profile	DEGREE Avg. Profile Growth 1991-1994			AGE GAP Age 25-34 less Age 25-64 Profile
	1991	1994	Growth % p.a.		1991	1994	Growth % p.a.		1991	1994	Growth % p.a.	
U.S.	84	85	0.4	1.2	37	32	-4.7	-0.3	24	24	0.0	-1.0
Singapore		48		16.0		22		8.5		8.8		3.9
New Zealand	54	57	1.8	4.8	21	23	3.1	-1.7	10	9	-3.5	0.8
Germany	82	85	1.2	5.6	22	23	1.5	-1.8	11	13	5.7	-0.7
U.K.	66	72	2.9	11.5	17	26	15.2	2.1	10	12	6.3	1.9
Australia (OECD)	57	50	-4.3	4.1	31	23	-9.3	0.6	10	13.4	10.2	1.4
Australia (Adjusted)	49	53	3.0		18	20	3.6		12.4	14.2	4.6	
Australia (QPPM)			2.9				4.1				4.3	

Qualification Profiles : "Education at a Glance - OECD Indicators" 1995 and 1996 editions. Singapore profiles from "Assessment, Qualifications and Standards: The UK Compared to France, Germany and the U.S : A Technical Report," by Hilary Steedman et al. London: The Centre for Economic Performance, LSE, 1997.

Age 25-34 profiles from unpublished OECD data.

Australian (Adjusted), see Appendix B. The published 1991 and 1994 data for Australia cannot be compared, because changes to the classification structures have created a major discontinuity. The adjusted data are comparable, although residual issues with the 1994 survey results limit the accuracy of resultant growth estimates.

Australia (QPPM) is a forecast derived from the Qualification Profile Projection Model rebased to 1996 ABS data. This model is discussed in more detail in Report No. 3, " Workskills and National Competitiveness: Internal Benchmarks."

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the future profile growth that nation will experience. Already the Age 25-34 post-compulsory and post-secondary profiles for Singapore are well ahead of Australia. The degree profile seems likely to exceed Australia's over the next few years.

Three profile growth figures for Australia are included in Exhibit 4.4. The first is the OECD figures which, as discussed above, are not comparable. The second uses adjusted 1991 and 1994 figures to provide comparable figures. The third estimates growth using the QPPM workforce profile growth estimates.

Population trends for benchmark countries

The relatively low profile growth in Australia compared with competitors was predicted in 1992 as part of an evaluation of the increases in university funding occurring at that time. Since then, there have been a major increase in funding for the Vocational Education and Training system and solid if fluctuating school retention rates.[23] There has been major growth but, as predicted in 1992, other countries have been better placed to resource profile growth.

While this benchmarking evaluation confirms the need for Australia to improve its qualification profile rankings, particularly at the post-compulsory level, it is important to appreciate what has already been achieved and to appreciate that the lower growth rates in Australia are in part a function of population growth compared with competitors.

Exhibit 4.5: Projected Growth in the Age 25-34 and Age 35-64 Groups in Each Benchmark Country illustrates major differences between the benchmark countries. Australia is the only benchmark country which must address a growing Age 25-34 population into the next decade.

Resource restraints

Implications of these growth differences for resources are explored in *Exhibit 4.6: Growth in Resources to Maintain 1990 Qualification Profiles*. The resource index, developed to explore the relative impact of population shifts between benchmark countries, measures the shifts in resources required to maintain existing Age 25-34 profiles. In addition, extra resources are required to shift a nations's profile. Four assumptions are used to develop this index.

(a) 70% of resources are applied to the Age 25-34 population 10 years previously. This reflects the requirement that education and training expenditure occur earlier than the appearance of qualifications in the Age 25-34 population profile.

(b) The balance of expenditure in the base year, 30% of 1980 resources, is applied to the Age 35-64 population.

(c) The 30 % category grows at the rate of the growth index for the Age 35-64 population in each country plus 1% p.a., to reflect the growing need for ongoing training.

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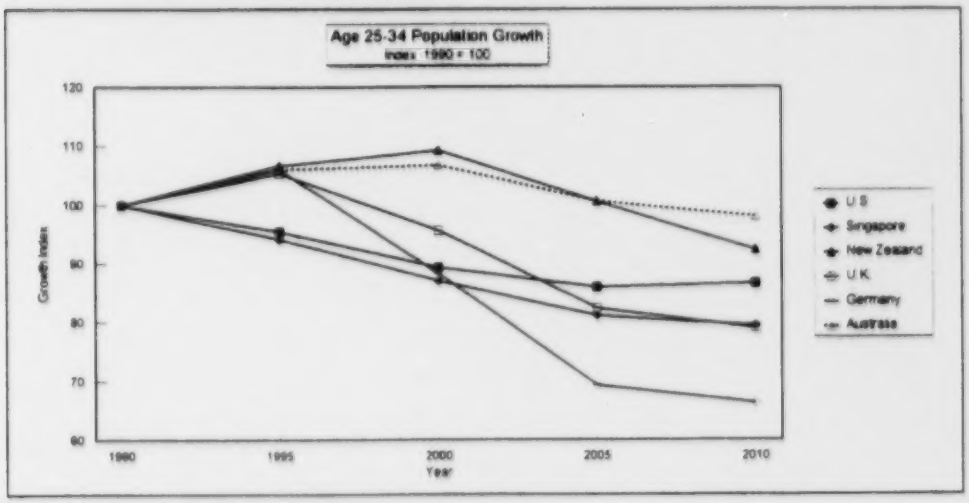
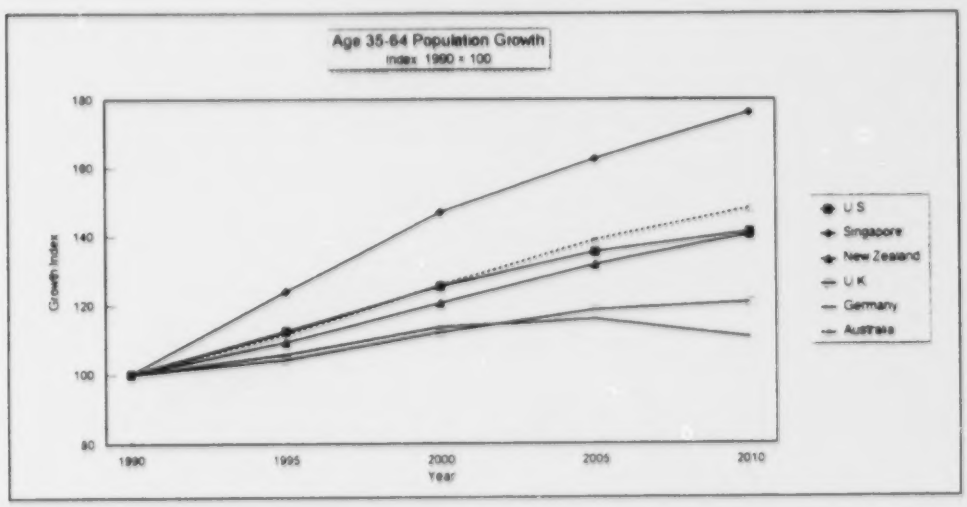
[23] See R.B.Cullen, Towards a Post-secondary Skills Profile for Australia. Melbourne: Victorian Post-Secondary Education Commission, 1992.

Nations differ in their overall population growth and in the age distribution within their populations. These differences present different challenges for national education and training systems.

Exhibit 4.5: Projected Growth in the Age 25-34 and Age 35-64 Groups in Each Benchmark Country





Population data: "World Population Projections: Estimates and Projections with Related Demographic Statistics", by Eduard Bos et al. Baltimore, Maryland: Johns Hopkins University Press, 1994.

Analysis: Performance Management Solutions, 1997.

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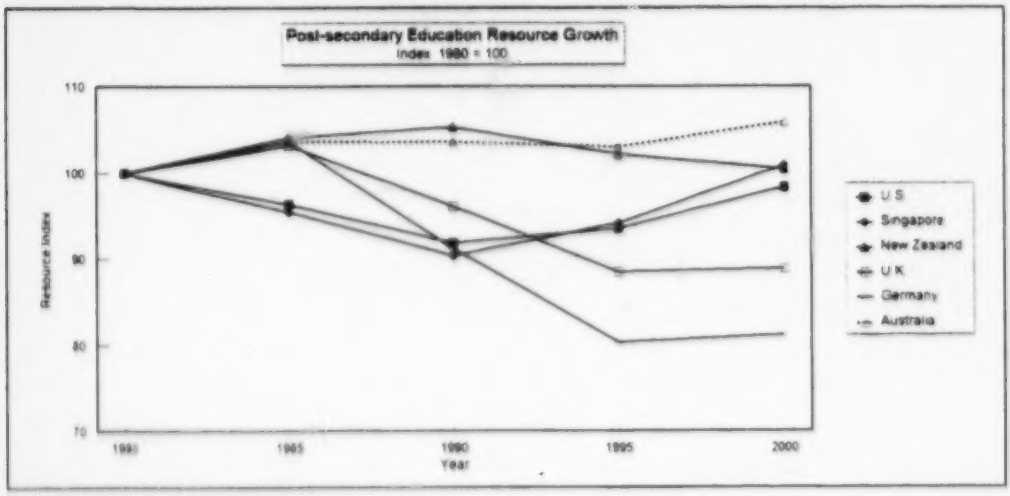
Growth: 1990-2010	Age 25-34	Age 35-64
U.S.	-13.3	41.3
Singapore	-20.6	76.0
New Zealand	-7.6	40.6
U.K.	-21.0	20.7
Germany	-33.6	10.7
Australia	-1.8	48.2

Population growth differences mean that countries require different levels of resource growth in education and training to maintain existing profiles. Over the period 1980-2000, Australia is the only benchmark country which requires resource growth to maintain historical profiles.

Exhibit 4.6: Growth in Resources to Maintain 1990 Qualification Profiles



Population data: "World Population Projections: Estimates and Projections with Related Demographic Statistics: A World Bank Book", by Eduard Bos et al. Baltimore, Maryland: Johns Hopkins University Press, 1994

Analysis: Performance Management Solutions, 1997

Resource Index Assumptions

a) 70% resources are applied to the Age 25-34 population 10 years previously. This reflects the requirement that education and training expenditure occur earlier than the appearance of qualifications in the Age 25-34 population profile.

b) The balance of expenditure in the base year, 30% of 1980 resources, is applied to the Age 35-64 population.

c) This 30 % category grows at the growth index for the Age 35-64 population in each country plus 1% p.a.

d) These two resource components are combined and a productivity saving of 2% p.a. is applied to the total index each year.

Growth	1980-2000	1990-2000
U.S.	-1.7	6.4
Singapore	0.9	10.5
New Zealand	0.4	-5.0
U.K.	-11.1	-7.2
Germany	-18.8	-9.9
Australia	5.9	2.3

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(d) The two resource components are combined and a productivity saving of 2% is applied to the total index each year.

Over the period 1980-2000, Australia requires 5.9% real growth in resources to maintain existing profiles. This compares with reductions in the index for Germany (-18.8%) the U.K. (-11.1%) and the U.S. (-1.7%). Both Singapore and New Zealand required small increases, both less than 1%. This explains why profile growth is occurring in countries like the U.K. and Germany, and why resource savings are probably available from such systems.

The analysis explains why the increases in education and training expenditures and resources in recent years have not translated into high relative rates of profile growth, and it suggests that Australia will face ongoing resource constraints derived from relative population pressures.

Four points can be drawn from the analysis of relative population and resource changes.

- First, while resource restraints may appear to ease as population profile pressures reduce, the effect for Australia will be an illusion if it wishes to maintain competitiveness with other countries who are increasing qualification stocks.

- Second, options which diversify the resourcing of education and training at all levels of the Australian economy need to be actively pursued.

- Third, issues of profile balance and of targeting priorities to optimise links with competitiveness are likely to become more critical in Australia than in a number of the other benchmark countries.

- Fourth, the growing numbers of younger trained persons can also be a major source of comparative advantage, providing that the mix of skills is competitive, that a strong basis for future learning is part of the core skills delivered, and that, where the growing Profile Age Gap is also a skills gap, Australia manages it successfully.

SUMMARY

Profile growth alone will not necessarily improve a country's qualification profile ranking. While Australian profiles appear to have increased between 1991 and 1994, the profile for Australia grew less rapidly than the average profile for OECD benchmark countries. An analysis of the Qualification Profile Age Gaps between younger and older persons suggests that Australia's growth is likely to continue to lag behind that of competitors, with the possible exception of the degree profile.

The relationship between qualification profile rankings, particularly between post-compulsory rankings and competitiveness, discussed in Section Three, suggests that, unless priorities focus on the post-compulsory levels (including School Year 12, apprenticeships and equivalent level vocational qualifications), the low ranking of the post-compulsory profile and the low relative growth are likely to continue to restrain competitiveness and to offset the strengths delivered by Australia's reform of higher level qualifications.

When Australian data are corrected to enable a comparison between 1991 and 1994, the

growth is clearly lower than the OECD average, with the possible exception of the degree profile.

- The post-compulsory Profile Age Gap, the gap between the post-compulsory profile of the Age 25-34 population and the Age 25-64 population in Australia in 1994, was 4.1%. The comparable gap for other OECD countries was 11.5%, which suggests that Australia's already low ranking will come under further threat.

- The gap between the post-secondary profile of the Age 25-34 population and the Age 25-64 population in Australia in 1994 was 0.6%. The comparable gap for other OECD countries was 2.1%, which suggests that Australia's relatively higher ranking for this profile may be eroded.

- The gap between the degree profile of the Age 25-34 population and the Age 25-64 population in Australia in 1994 was 1.4%. The comparable gap for other OECD countries was 1.1%, which suggests that Australia's relatively higher ranking for this profile can be sustained if current levels of degree outputs relative to the workforce can be maintained.

Between 1990 and 2010 the Age 25-34 population in Germany is forecast to decline by 33.6% compared with a decline in Australia of only 1.8%. Analysis of population shifts and resources available for education and training demonstrates that profile growth is likely to be more restrained by resources in Australia than in the other benchmark countries. Although this analysis of future growth addresses only the relative levels of resources required to maintain existing profiles, the analysis has clear implications for both education and training strategies and competitiveness strategies in Australia.

- While resource restraints may appear to ease when the school leaver cohort reduces in numbers, the effect in Australia may prove to be an illusion. Other countries appear to be training more of their young people to ISCED Level 3, and some are also addressing the skill gaps of those already in the workforce.

- These resource pressures suggest that options which diversify the resourcing of education and training at all levels of the Australian economy need to be actively pursued.

- Issues of profile balance and of targeting priorities to optimise the links with competitiveness are likely to become more critical in Australia than in a number of the other benchmark countries.

- The growing numbers of younger trained persons can also be a major source of comparative advantage, providing that the mix of skills is competitive; that a strong basis for future learning is part of the core skills delivered; and that, where the growing Profile Age Gap is also a skills gap, Australia manages it successfully.

SECTION FIVE: COMPARING THE PERFORMANCE OF EDUCATION AND TRAINING REFORM IN SELECTED BENCHMARK COUNTRIES

To maintain its competitive position, a country's education and training priorities need to keep pace with global change. To create a source of national competitive advantage, education and training reform needs to benchmark specific country differences and to find ways to implement reform faster and more effectively than its competitors.

Section Five examines education and training reform and the links between education and training reform and industry competitiveness in selected countries.

Links between education and training reform and national competitiveness are critical to meeting the expectations of individuals and of business. Yet the regulatory and adjustment processes which control education and training will not automatically close the strategic gaps between the needs of industries and the desires of students and education and training institutions. Report No.1 analysed these linkages and suggested three implications for education and training reform.

- The move to mass post-secondary education and training is dramatically altering the way in which students see and employers use qualifications.

- The dynamic nature of workskill formation means that the trend to upgrade the skills of the existing workforce will continue, and that countries which perform this upgrading most effectively will gain a major workskill advantage over those which remain focused on entry qualifications.

- While the cycle time between the identification of a performance challenge in industry and the implementation of an effective response has reduced, the cycle time between the identification of education and training priorities and the delivery of new skills into the workforce has tended to increase. This cycle time mismatch between industry and education and training planning must be bridged as part of effective education and training reform. A least three different bridging strategies need to be explored: first, devolution and deregulation are solutions, although they require new approaches to the management of quality and relevance; second, workskill planning systems and associated interventions can link the business and education and training planning horizons, although they need to focus on industries to be effective; third, reducing cycle time in education and training systems requires management systems with the capacity to use ongoing evaluation and benchmarking, particularly external benchmarking, to support continuous improvement processes.

Exhibit 5.1: Checklist for the Comparative Evaluation of Education and Training Reform summarises the results of the analysis in Report No. 1, and has been used as a focus for this examination of education and training reform in each of the benchmark countries. The Checklist compares eight factors of national performance: industry competitiveness; workskill development; social impacts; qualification profiles; responsiveness; resource allocation and

Exhibit 5.1: Checklist for the Comparative Evaluation of Education and Training Reform (Page 1/3)

Is industry increasing its competitiveness?
Are key industries world competitive? Have industries increased competitiveness relative to other countries/regions? Is competitiveness translating into national/regional wealth and jobs?

- Has the world competitiveness ranking improved?
- What key factors are likely to drive and restrain competitiveness?
- To what extent are workskill priorities integrated with competitiveness priorities?

Are workskills a source of national competitive advantage?
Is the workskill creation process a source of competitive advantage compared with other countries? How might this advantage be increased? Has the education and training system combined with industries to add competitive value to workskills, as well as reordering the employment queues?

- Are the workskill requirements of key industries world competitive? Are workforce skills generally competitive? Are workskills likely to drive or restrain competitiveness in the future?
- Is the national workskill creation process superior to that of other countries? What features of the process can be improved?
- Have the triggers which link industries' needs and education and training priorities adapted to new needs?
- Do new entrants to the workforce bring a mix of conceptual, operational and learning skills? Is this mix more or less effective than that delivered by other countries?
- Is the value of existing skills being effectively maintained, and upgraded over time? Is the reskilling agenda fitted to the needs of the national skill base? Compared to other countries, to what extent are the skills of older workers a source of competitive value?

Has education and training reform addressed the social impacts of workplace reform more effectively than other countries?
How has the education and training system responded to the needs of the unemployed and those becoming skill redundant? How has the education and training system combined with industries to address skill troughs and skill deficits? Are these responses more or less effective than those of other nations?

- Are those completing qualifications more employable than those without?
- Does the education and training system assist workforce mobility, by responding to the needs of those whose skills have become redundant or require major adaptation?
- Does the education and training system recognise the existence of skill troughs? Are programs in place to minimise troughs and to assist those who become caught in various skill troughs to overcome this disadvantage?
- Has the education and training system managed to add competitive value to workskills and to address the social impacts of change, or have the supply priorities become skewed?

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Exhibit 5.1: Checklist for the Comparative Evaluation of Education and Training Reform (Page 2/3)

Is the country's ranking on qualification stocks a source of competitive advantage?
Is the qualification profile ranking a driver or a restraint on competitiveness? Are profile rankings competitive? Is the mix of qualifications offered at each level competitive? Are the processes which translate qualifications into competitiveness more or less effective than those in benchmark countries?

- Are current profile stocks competitive at each of the three levels analysed? (Post-compulsory / Post-secondary / Degree)
- Are growth projections for the qualification stocks likely to improve, maintain, or reduce the overall ranking with other countries? (Post-compulsory / Post-secondary / Degree)
- Are the processes which translate qualifications into competitiveness more or less effective than those in other benchmark countries?
- To what extent does the mix and relevance of qualifications deliver strategic skill needs? Have the education and training system and employers adapted to optimise workvalue by integrating, rather than segmenting, the delivery of each of the three aspects of knowledge: concepts; operationalization; and the capacity for ongoing learning?
- Has a national skills framework been developed? Is it a source of competitive advantage compared to other countries?

  Does the framework address the links with other national and international frameworks effectively?

  Can the framework be applied to skills developed in the workplace, as well as in formal qualifications?

  Does the framework address the twin needs to deliver core skills and to allow competitive flexibility at the enterprise level?

  To what extent is credit available between programs to facilitate ongoing education and training? How does the skill framework contribute to the credit process?

Is the education and training system more responsive to changing national needs than the systems used by other nations?
Has the nation exploited mass secondary and post-secondary education more effectively than its competitors? Has the cycle time between the identification of new education and training needs and the responses delivered to the workforce increased or decreased? Has the cycle time mismatch between industries and education and training been bridged?

- Has the interface between schools, non university and university sectors adapted to the new needs created by mass school and post-school education?
- Has the education and training system altered volume and qualification levels and mix to address future needs and the actions of competitors?
- Have education and training institutions servicing each qualification level adapted to the changing needs for ongoing education and training? (Post-compulsory / Post-secondary / Degree)
- Are regulatory and skill frameworks a focus for inertia or a focus for improvement?

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Exhibit 5.1: Checklist for the Comparative Evaluation of Education and Training Reform (Page 3/3)

Are the resources and delivery structures used by the education and training system better able to address new competitive priorities than the systems utilised by other countries?

- To what extent is the volume of resources sufficient to maintain and improve existing qualification profiles, given the population changes facing a particular nation?
- Is delivery organised to optimise the cost-effectiveness of education and training to education and training institutions, or to students, or to industries?
- To what extent is the resource allocation system able to address new, rather than old, needs, including: the changing balance of priorities between education and training sectors and institutions; and the changing priorities of students and industries, rather than the preferences of institutions?
- To what extent is the education and training system able to respond to the impact of shifts in industry mix and growth in labour market demand for qualifications? Are these shifts understood? Are they part of planning processes? To what extent are systemic factors likely to block responses to such shifts?
- Is delivery and resource allocation devolved to maximise flexibility and minimise cycle time? Have accreditation and approvals processes been re-engineered to cut cycle time and improve effectiveness?

Has the labour market adjusted to deliver the flexibility and cost-effective workskills required by industries to compete with industries based in other countries?
How has the labour market responded to changes in competitiveness and workskill requirements? Do these responses add or subtract value from the workskill creation process? How do these labour market responses compare with the responses of other nations? Is the labour market a source of competitive advantage for industries and individuals?

- To what extent does the labour market respond to new skill needs?
- Does the labour market send the most effective signals to students and employers?
- Are those with qualifications more employable than those without? Do those with qualifications earn higher premiums in the labour market than those without?

Has education and training reform evolved beyond the stage of discontinuous change to a system capable of ongoing evaluation and improvement? Is this system likely to outperform the improvement systems used by other nations?
How have the objectives of education and training reform been defined and evaluated? Have processes of continuous improvement been developed: to benchmark improvements; to evaluate the implementation of change; and to monitor continuously in order to learn from the successes and failures of competitors? Are these improvement processes more or less effective than those of other countries? How might they be improved?

- Is the impact on cycle time evaluated? Has the cycle time mismatch between education and training and key industries been bridged effectively?
- Is the impact on competitiveness evaluated?
- Are continuous improvement processes established? Are they effective? Is the focus on outcomes or processes? Is the focus internal or external?

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delivery structures, labour market flexibility, and capacity for ongoing performance improvement.

Reform in each of the benchmark countries is now reviewed and the implications for reform in Australia are discussed.

Education and training reform in the United States

The U.S. education and training system is devolved to States and institutions. The end of post-compulsory schooling in the U.S. is the College Diploma. About 80% of each age cohort complete college programs. There is no uniform standard or evaluation of these programs, which has led some commentators, correctly, to question the standards at the lower end of the distribution of those completing college. Another 12% complete alternative adult entry programs. This explains the post-compulsory profile of 86%.

The post-secondary profile includes 8% of persons with two-year degrees and a further 20% of persons with four-year degrees or postgraduate qualifications. As with the college population, both the two-year and four-year degrees accommodate a wide range of programs and standards. In addition, the completion rate across all two-year programs is relatively low.

There are extensive credit arrangements across the system, and skilled students seem to be able to move through the system into the higher quality programs.

The U.S. is currently benchmarking indicators against other countries and evaluating the implications for national competitiveness.[24] Analysis of school populations has identified a skills trough which appears to continue through subsequent levels of education. At another level, there is some concern that other countries seem likely to close the lead which the U.S. and Germany have long held in the post-compulsory and post-secondary profiles.

The use of external benchmarking is further developed in Education and the Economy: An Indicators Report which presents a powerful examination of the links between productivity and education and training, and which addresses both the slowing of productivity growth in the U.S. in recent years and the implications for the global competitiveness of U.S. companies.[25]

Two aspects of the U.S. benchmarking are particularly interesting. The U.S. has taken the OECD indicators and applied them to its national situation. This approach contrasts with the U.K. Skills Audit which focused on altering the OECD indicators before attempting to use them to guide change. The U.S. is a leader in both competitiveness and qualification stocks. Benchmarking suggests that other countries are catching up with the U.S. The imperatives for education and training in the U.S. are not to create more qualifications, but to address

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[24]U.S. Department of Education. National Center for Education Statistics. *Education Indicators: An International Perspective*, NCES 96-003, by Nancy Matheson, Laura Hersh Salganik, Richard P. Phelps, Marianne Perie, Nabeel Alsalam, and Thomas M Smith. Washington, DC: 1996.

[25]U.S. Department of Education. National Center for Education Statistics. *Education and the Economy: An Indicators Report*, NCES 97-269, by Paul Decker, Jennifer King Rice, and Mary T. Moore. Mary R. Rollefson, Project Officer. Washington, DC: 1997.

issues such as whether the quality and relevance of new qualifications are competitive with other countries, whether the system is responding effectively to new demands, and whether the system is renewing the value of existing qualifications as old skills become redundant.

Four points made in the Education and the Economy analysis relate directly to the discussion of profile linkages in Section Three.

- First, it suggests that "it is necessary for countries to have a level of education that is roughly comparable to that in the leader country, in order to benefit from the leader country's technical knowledge."[26]

- Second, it suggests that a high rate of secondary education is especially important in enabling countries to be among the world leaders in worker productivity.

- Three, it suggests there is substantial evidence (in the U.S.) of a connection between college education and productivity which is reflected in higher pay rates.

- Finally, the U.S. data show strong links between qualifications and labour market returns at all levels of education. Similar results have been reported in Germany in a much more regulated labour market system which nevertheless is geared to differentiating between and recognising skills. While these relationships tend to exist in countries like Australia and the U.K. for degree level qualifications, labour market pay rates seem less able to differentiate between lower level qualifications.

The U.S. system provides the benchmark for federal deregulation. The U.S. system is often criticised for the wide range of standards it allows, but it is an example of a market-driven system. Qualifications differ, and students and employers know it. Market forces and student choice operate to shorten cycle time and to ensure that alongside obvious quality troughs, the U.S. system has more than its share of quality peaks.

There are five implications for Australian reform.

- The U.S. system provides clues to the implications of developing the mass post-secondary education model.

- Increasingly, parts of the Australian post-secondary systems are developing U.S. - style deregulated characteristics, while other parts remain focused on the regulated European models. The two approaches seem to be inconsistent. The regulated model addresses minimum standards and tends to penalise institutions seeking to exceed those standards. The U.S. system is more flexible and more variable.

- In many cases in the U.S., central regulation is replaced by State-based regulation. Although this provides scope to reflect regional differences far more effectively than can occur in centralised systems, the reality is that some U.S. States do this well and some perform poorly, which is a feature of most federal systems. The Office of Educational Analysis and Improvement is a U.S. - style solution which provides the capacity to collect and independently analyse education and training data. This

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[26] Ibid., p.82.

contrasts with Australia, where each system guards data and most analysis is undertaken by and for governments. This Office is a model which Australia might usefully introduce to focus the activities of its particular federal system.

- The U.S. system is currently piloting skill standards. There is a concern to avoid the inertia seen in other systems, and to provide flexibility for enterprises to produce competitive qualifications within a framework that seeks to deliver core skills at the general and industry level.

- Finally, a labour market able to reward skills may prove to be a prerequisite for high levels of post-compulsory qualifications, and hence for high levels of competitiveness. Both the U.S. (deregulated) and the German (regulated) labour markets appear to offer such rewards more effectively than the Australian labour market.

Education and training reform in Singapore [27]

Singapore is an example of an economy managing a major transition to competitiveness. Industry development and competitiveness have been planned by joint government-business projects.

Workskills were identified early in the process, as both a potential restraint and an opportunity to create a source of competitive advantage. The solution was to work with business to develop competitive workskills by: providing major ongoing training; building strong school, technical education, and university systems; and focusing development hierarchically, starting with the school system.

School reforms have delivered a high level of skill for a high proportion of the younger age group. Pressures to expand the university system in Singapore appear to have been contained, forcing development into the vocational system.

These strategies have made workskills a competitive strength for Singapore and have created by far the strongest future profile growth projections of any of the benchmark countries. In addition, growth seems to be targeted towards the demands of key industries and, certainly, towards technical qualifications.

Rapid skilling of the younger age population created a skill gap with older persons. Education and training for the older population has focused on reducing the competitiveness impacts of this gap, by providing the remedial skills required for older persons to contribute to Singapore's development.

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[27] This discussion of Singapore's education and development strategies is based on:
The Skills Audit: A Report from an Interdepartmental Group. London: Department for Education and Employment and Cabinet Office, Office of Public Service, 1996.
Assessment, Qualifications and Standards: The UK Compared to France, Germany, Singapore and the U.S.: A Technical Report, by Steedman et al. London: The Centre for Economic Performance, LSE, 1997.
Low, L., Heng, T., Wong, S., Yam,T., and Hughes, H. Challenge and Response. Singapore: Times Academic Press, 1993.

Features of the Singapore reform strategies are that: they have addressed workskills from the school level upwards, they have addressed national workskill planning, they have targeted workskills to national competitiveness policies very successfully, and finally, they have targeted the Profile Age Gap and implemented policies to minimise the impact on competitiveness.

The Singapore reforms provide a benchmark for linking education and training reform to national competitiveness through workskill planning. While the idea of planning focused on outcomes, rather than on systems or resources, is difficult for many in education to comprehend, the results achieved by Singapore cannot be ignored. Singapore has been highly successful.

The implication for Australia is that Singapore has planned its highly successful development by adapting U.K. frameworks to deliver a source of competitive advantage. There are three obvious lessons for Australia.

- How to focus a central planning system on outcomes and competitiveness, rather than on inputs.

- How to strengthen the delivery of basic skills, while still focusing on skills needed by specific industries.

- How to target education and training on Profile Age Gaps and on gaps between industries' priorities and education and training priorities, not to produce access and equity, but to add workvalue by removing the competitiveness restraints that can occur without such intervention.

Education and training reform in New Zealand

The New Zealand system appears to experience some of the problems of the Australian system. However, there are four differences. New Zealand has been more successful in improving competitiveness in recent years than Australia, New Zealand does not face the same population-driven resource pressures on education and training as Australia, New Zealand has developed a more flexible and diversified approach to funding which is integrated across all post-secondary systems, and, finally, in common with the U.K. and the U.S., New Zealand's more deregulated labour market probably increases the cost-effectiveness of skills to industry.

There are two implications for Australian reform.

- The integration of planning and funding models appears to have removed some of the barriers that tend to preoccupy the Australian system.

- The combination of simplified yet integrated central planning, a more flexible labour market, devolution of management and the development of a more diversified funding base appear to have met national workskill needs.

Education and training reform in Germany[28]

The German 'dual ' apprenticeship system is the most effective mass vocational training system yet devised. However the system is currently under challenge from the twin pressures of: university expansion; and industries' requirements for more flexible and cost-effective responses to changing needs. The system streams students from school into apprenticeships which cover all industry areas. Business and government combine to deliver agreed skills. The process is tripartite, in that it also involves relevant unions.

An alternative stream leads into a traditional university system. Although technical universities have been added to traditional universities, they only represent perhaps 20% of the system.

The reduced number of persons leaving the school system in Germany means that access to post-secondary programs has become easier for young persons. Although higher population growth in the former East Germany might be expected to limit this impact, birth rates there have declined dramatically since unification.

In recent years, apprenticeships have remained relatively constant. Growth in participation has been in the degree profile. There are three implications for education and training reform.

- Apprenticeships are now drawing from a less talented pool.
- There is now competition in the labour market between increased numbers of graduates with new skills and those coming through the traditional apprenticeship streams.
- The lack of reform in the university sector means that the capacity of that sector to provide a range of programs to meet the needs of a more diverse intake group is also limited.

In addition to the impact of student preferences and demography, economic pressures flowing from both unification and the highly-regulated labour market are placing new pressures on enterprises and are forcing change on the German system. As a result, its capacity to enrol apprentices has declined. The system is now addressing changes to increase flexibility and cost-effectiveness to both employers and students.

Strengths of the German system remain a wide acceptance of the dual system by employers in all industries. Weaknesses are probably: that the system has encountered difficulty adapting to demand for more cost-effective and responsive training; that growth in degree qualifications in the labour market, combined with lack of reform to the university system, has created new workskill discontinuities in the labour market, which need to be bridged by repositioning the role of both education and training sectors.

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[28]This discussion of Germany's education and development strategies is based on Green and Steedman, op. cit., and also on "Germany's Dual System: Lessons for Low and Middle Income Countries," by Indermit S. Gill and Amit Dar. Washington: World Bank, 1996. Second draft: August 25, 1996.

The German system provides a benchmark for post-compulsory vocational qualifications. Whether current rigidities in the system are a function of short-term stresses generated by German unification, or whether reforms to the dual system can address the need to shorten response times, are questions which will be resolved over the next few years. The lack of university reform in the German system seems to be an anomaly. The tensions which this lack of reform appears to be causing other parts of the system are predictable.

Four implications for Australian reform can be drawn from the German experience.

- German vocational programs are still an important guide for those seeking to achieve world best practice.

- Difficulties the German system has encountered in responding to new needs are difficulties faced by most regulated systems.

- Differences between the U.S. notion that skills can be acquired in a modular fashion over time and the German notion that core skills need to be integrated, packaged and delivered, require careful consideration. The strength of the U.S. model is that it can be very cost-effective. The strength of the German model is that it develops labour market expectations about core skills, and it enables enterprises to arrange ongoing training on the assumption that core skills exist.

- Finally, differences between the German and U.S. solutions for flexibility also warrant close examination. Response times in the German system will always be relatively long. The sorts of changes the system sees as creating flexibility are in many respects the sorts of changes being explored in some systems in Australia.

Education and training reform in the United Kingdom

The U.K. has sought to impose competitiveness and workskill targets on traditional education and training. Whether the system has internalised these ideas as new educational values, or whether it has simply added them as another government interface which must be managed, is far from clear.

The traditional U.K. school system has two endpoints, the general qualification at the end of Year 11 and a qualification which provides entry to university programs after Year 13. Most university programs remain three years in duration.

The university system has been reformed by amalgamation with the former polytechnics, to provide a broad base for university expansion. The U.K. dismantled its traditional apprenticeship system and, although various replacements have been developed, the system still seems to lack a strong vocational stream. A number of analysts have suggested that this is the major weakness identified by the recent Skills Audit.

The U.K. has achieved major competitiveness improvements. While they are generally held to flow from labour market deregulation, there has also been considerable education and training reform. However, there is some evidence that the expansion in access is eroding standards in a system that previously relied on streaming to deliver quality control. In addition, as with Australia, the lack of strong vocational programs at the post-compulsory

and lower post-secondary levels will probably limit competitiveness impacts.

The U.K. system and perhaps the New Zealand system provide benchmarks for combining education and training reform with labour market deregulation to create added value for students and industry. Although many deplore the resultant employment conditions, such strategies seem to deliver employment and to operate to reward those who can add value to the performance of particular enterprises.

Education and training reform in Australia

When cyclical effects are removed from the data, Australian school systems have increased retention rates dramatically in recent years. Numbers of persons with a highest qualification at Year 12 have grown strongly. Nevertheless, the increases which have occurred are not enough to deliver a post-school profile of 80%.

There is a need for vocational qualifications to bridge the post-compulsory qualification gap between Australia and other countries. In particular, the failure of the traditional apprenticeship system to address the needs of newer industries and the failure of a number of alternatives to develop effectively have caused the current problem. Although a large number of basic vocational qualifications are awarded, there are real doubts about whether they meet the requirements for classification at ISCED Level 3 (post-compulsory). In part, this is due to the degree of specialisation adopted. In part, it is due to the modular nature of these programs and the limited delivery of general, as distinct from vocational, skills.

SUMMARY

A comparison of education and training reforms in benchmark countries identifies major differences in approach, which are likely to impact on both the cost-effectiveness of education and training and on the capacity to translate education and training outcomes into national competitiveness.

Workskills provide a focus for managing the changing linkages between education and training and the competitiveness of industries and can be used to identify three changes which education and training reform must address.

- The move to mass post-secondary education and training is dramatically altering the way in which students see and employers use qualifications.

- The dynamic nature of workskill formation means that the trend to upgrade the skills of the existing workforce will continue, and that countries which perform this upgrading most effectively will gain a major workskill advantage over those which remain focused on entry qualifications.

- While the cycle time between the identification of a performance challenge in industry and the implementation of an effective response has reduced, the cycle time between the identification of education and training priorities and the delivery of new skills into the workforce has tended to increase. This cycle time mismatch between industry and education and training planning must be bridged as part of effective education and training reform.

A comparison of education and training reforms in benchmark countries identifies major differences in approach, which are likely to impact on both the cost-effectiveness of education and training and on the capacity to translate education and training outcomes into national competitiveness. Three implications are drawn from this analysis of education and training reform in the five benchmark countries.

- The U.S. system provides the benchmark for federal deregulation. The U.S. system is often criticised for the wide range of standards it allows. But it is an example of a market-driven system. Qualifications differ, and students and employers know it. Market forces and student choice operate to shorten cycle time and to ensure that, alongside obvious quality troughs, the U.S. system has more than its share of quality peaks. The Office of Educational Research and Improvement is a peculiarly U.S. solution which offers real value in an Australian context, because it could depoliticise some of the debates about statistics which tend to preoccupy the Australian education systems.

- The Singapore reforms provide the benchmark for linking education and training reform to national competitiveness through workskill planning. While the idea of planning focused on outcomes, rather than on systems or resources, is difficult for many in education to comprehend, the results achieved by Singapore cannot be discarded because it is a small country. It is also highly successful.

- The New Zealand reforms provide a benchmark for combining simpler and better integrated central planning and funding systems with devolution, a more flexible labour market, and the development of a more diversified funding base.

- The U.K. system and perhaps the New Zealand system provide benchmarks for combining education and training reform with labour market deregulation to create added value for students and industry. Although many deplore the resultant employment conditions, such strategies seem to deliver employment and to operate to reward those who can add value to the performance of particular enterprises.

- The German system provides a benchmark for post-compulsory vocational qualifications. Whether current rigidities in the German system are a function of short-term stresses generated by change and unification, and whether reforms to the dual system can address the need to shorten response times, are questions which will be resolved over the next few years. The latest reforms address the need for a more flexible and cost-effective (to employers and students) system of vocational training. The wide acceptance in Germany of the current system as a major pathway into the world of work means that new developments in the German training system to address current problems are likely to provide useful ideas for other systems. The lack of university reform in Germany seems to be a threat to that system. This analysis suggests that future competitiveness pay-offs for a country like Germany may come from differentiation between competitors on the basis of higher level qualification profiles. If this is correct, changes to the university system to deliver cost-effective skills to business and pressures created by a growing degree stock will need to be addressed by the 'dual' system.

SECTION SIX: IMPROVING THE COMPETITIVENESS OF AUSTRALIAN WORKSKILLS

By most measures, workskills in Australia have increased in recent years. However, these improvements have not been translated into a general improvement in national competitiveness. It is important t explore why competitiveness has not increased. What can Australia learn from the successes of other countries? Have other factors offset improvements in workskills? Has the process produced the wrong mix of workskills for the future needs of different industries? Has Australian management met the challenge of translating new workskills proactively into added competitive value for particular industries?

If the end objective is improvement, analysis and evaluation need to become part of an ongoing improvement process. Four steps are involved.

- First, it is important to measure changes to national qualification stocks and to the national skill base.

- Second, it is important to evaluate progress against the performance of others with whom Australia is seeking to compete.

- Third, it is necessary to use this information to develop and implement action strategies which remove blockages and add value to the processes which convert education and training outcomes into workskills and then into competitiveness.

- Finally, it is important to create a continuous improvement process: by benchmarking progress, by evaluating the impact of solutions, and by continuing to monitor and learn from the successes and failures of competitors.

This Section examines opportunities for improving the competitiveness of the Australian workforce. A comparative analysis is utilised to identify threats and opportunities, to propose an agenda for improvement, and to suggest benchmarks against which future developments can be monitored.

An overview of results

The following questions, identified at the commencement of the benchmarking project to provide a focus for analysis, are now used to review the results.

Are Australian workforce qualification profiles competitive with those of overseas benchmark countries? Is the Australian position likely to improve or deteriorate in relative terms? What are the likely impacts on national competitiveness of relative shifts in Australian qualification profiles ? Are particular industries at risk?

While the impact of qualification stocks on competitiveness is probably neutral at this point in time, Australia's ranking amongst OECD countries is likely to deteriorate over the next few years unless specific actions are taken to strengthen results, particularly in the post-compulsory

area

The competitiveness advantage created by university reforms appears to be offset by lower national performance at the post-compulsory level, which includes those who have completed Year 12 in the school system and the majority of those completing VET qualifications. The VET component of the post-compulsory schooling category includes those who have completed a 'skilled vocational' qualification (apprenticeships and equivalent) and some of those who have completed 'basic vocational' qualifications.

Although qualification profile data are becoming available by industry, there is a lack of benchmark data on industry competitiveness by country. Three points can be made about the need to consider industry profiles in more detail.

- First, different industries make very different uses of qualifications.
- Second, links between workskills and competitiveness vary between industries.
- Third, qualifications used by industries vary between countries. In part, country differences reflect supply-side differences in the structure of education and training systems. In part, they may also reflect competitiveness differences between industries.

Further benchmarking is required to determine which industries are specifically at risk. Previous reports have proposed international benchmarking exercises for two Australian industries, 'Manufacturing Food' and 'Communications'. The first is an industry which should be more competitive in Australia than it appears to be. The second is an industry undergoing major structural change which does not appear to have impacted fully on the training and workskills agenda.

Is the growth in education and training sufficient to retain and improve the relative position of the Australian workforce?

Although there has been major growth in education and training expenditures, population pressures faced by Australia compared with competitors mean that actual profile growth in Australia is lagging behind OECD averages, particularly for the post-compulsory and post-secondary groups.

Are there links between differences in qualification profiles and industry competitiveness between countries?

There are clear links between qualification profiles and competitiveness, and they are examined in detail in Section Three. However, the links focus on country rankings rather than on growth. The strongest correlation is with the post-compulsory profile ranking, with the correlation decreasing for the post-secondary and degree profiles. Links with competitiveness are complex, but there is some evidence to suggest that they are hierarchical, and that countries need to be competitive, first at the post-compulsory level, then at the post-secondary level, and finally at the degree level.

Can competitiveness be increased by more education and training, by more relevant education and training, or by altering education and training priorities to meet industry needs more effectively?

This analysis suggests that the growth which has occurred to date in the national stocks of

qualifications needs to increase. Australian competitiveness can be increased: by reviewing sector balance issues, to ensure that the needs of students rather than the needs of education institutions are met; and by reviewing the balance of provision within sectors, to ensure that it is driven by student and industry priorities. In seeking to bridge profile gaps with other countries, there needs to be a strategic assessment of which gaps will impact on industry performance and which will not. The immediate gap to address is at the post-compulsory level. It is important to test the impact of this gap on competitiveness, and to develop strategies to bridge at least critical parts of the gap. The objective should be to halt the widening gap between Australia and other OECD countries, and then to commence the process of closing the gap.

Rapid response in the Australian education and training system is blocked: by traditional approaches to regulation; by centrally-planned funding which has not diversified sufficiently to allow the sort of flexibility found in some of the benchmark countries; and by sector and State boundaries which can distort and delay responses to new needs. Given the critical nature of the post-compulsory ranking, it is important to co-ordinate the activities of the three post-compulsory sectors in this area. School systems, the VET system, and the university systems are all active participants and need to be involved in any solution.

The solution to many of the priority alignment issues would appear to be further deregulation, combined with continuation of recent trends to diversify funding sources. The objective of deregulation should not be to shift the central resource pot from one government agency to another, but to empower students and industries to drive the education and training system. The single most important test of such reforms is whether they reduce or increase cycle time (the lag time between the identification of an education and training need and the delivery of an effective response to that need into the workforce.)

What is the likely impact of changing industry mix and competitiveness on qualification profiles in Australia and in other benchmark countries?

No assessment of current post-compulsory education and training priorities can be effective without an assessment of the links with competitiveness and with the changing patterns of industry development. Most assessments ignore both issues.

Attempts by Singapore to develop these links appear to have been very successful. Attempts by the U.K. to explore such issues, while they have made important progress in the recent Skills Audit, have so far failed to address the core issues involved. Interesting case studies are now emerging but, in general, the lack of focus on industry data appears to be a weakness in current international benchmarking efforts.

In Australia, there has been a continuing focus on the qualification needs of specific industries and on links between training and industry performance. If qualifications are a measure of workskills, it is logical to focus profile analysis on the workforce. When workforce-based, rather than population-based, profiles are analysed, links between education and training and industry performance are more readily identifiable.

The mix of post-compulsory qualifications that will be sought on the labour market is influenced significantly by assumptions about the mix of industry growth. While centrally-planned solutions tend to create more problems than they solve in complex systems, it makes sense to avoid major blockages and shortages, and it makes sense to ensure that the key

workskill needs of leading edge industries are met.

There are three industry-focused strategies which can assist government and managers to target priorities.

- The first requirement is to address the future mix of government and business sector activities, because the two groups make different uses of qualifications.[29]

- The second strategy is to identify industries which are expected to provide the base for a nation's future competitiveness, and to ensure that the workskill needs of those industries are understood and met.

- The third strategy is to consult and listen and to improve the balance of the system at the margin. While such adjustments can deliver major value, the process can also exhaust the patience of all involved. The objective must be to add value to industry competitiveness, and the adjustment strategies need to be supported by a commitment to resource and deliver solutions and to evaluate external impacts.

Are some countries, relative to others, altering education and training priorities more effectively to address emerging industry needs? Where are the key blockages? What are the most effective adjustment mechanisms?

The Singapore reforms provide the benchmark for linking education and training reform to national competitiveness through workskill planning. While the idea of planning focused on outcomes, rather than on systems or resources, is difficult for many in education to comprehend, the results achieved by Singapore cannot be discarded because it is a small country. It is also highly successful.

The U.S. system provides the benchmark for deregulation. The U.S. system is often criticised for the wide range of standards it allows. But it is an example of a market-driven system. Qualifications differ, and students and employers know it. Market forces and student choice operate to shorten cycle time and to ensure that alongside obvious quality troughs, the U.S. system has more than its share of quality peaks.

The U.K. system and perhaps the New Zealand system provide benchmarks for combining education and training reform with labour market deregulation to create added value for students and industry. Although many deplore the resultant employment conditions, such

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[29] Australia. Department of Employment Education and Training ,Economic and Policy Analysis Division. Australia's Workforce 2005: Jobs in the Future . Canberra: AGPS, 1995. The most recent attempt at workforce planning developed a scenario where growth was largely driven by retail trade, which uses few qualifications, and by governments, which uses many. At the same time, a high growth scenario was developed which reduced the growth of government and expanded business growth. While neither of these scenarios is particularly compelling, they can be used to illustrate how sensitive the demand for qualifications in the labour market is to different industry development assumptions. The high growth scenario requires fewer teachers and nurses and more skilled vocational qualifications. The financial impact between sectors in a centrally-planned system is of the order of 10% of the total funds excluding schools. The impact on priorities within education and training sectors is also important. Unfortunately the analysis addressed education and training in a macro sense and failed to identify the shift in labour market demand implicit in these growth assumptions.

strategies seem to deliver employment and operate to reward those who can add value to the performance of particular enterprises.

The German system provides the benchmark for post-compulsory vocational qualifications. Whether current rigidities in the system are a function of short-term stresses generated by German unification, or whether reforms to the dual system can address the need to shorten response times, are questions which will be resolved over the next few years. The lack of university reform in the German system seems to be an anomaly. The tensions which this lack of reform appears to be causing other parts of the system are predictable.

How is the education and training mix changing in countries with rapidly ageing workforces? What strategic threats and opportunities does this offer Australia with a relatively younger workforce?

This research suggests that a more relevant question is, "How are countries managing the impact of Qualification Profile Age Gaps on competitiveness?"

Although Australia has a relatively small Profile Age Gap, it is growing, and there is anecdotal evidence that it is creating tensions at the enterprise level, as older persons feel disenfranchised and cut off from both promotions and the growing number of higher level retraining options. Resource restraints driven by population pressures have limited the resources available to provide access to education and training for older persons.

The most notable example of management of a large Profile Age Gap is Singapore. Limitations imposed by a weak skills base among older persons have been addressed: by emphasising workskill development at the enterprise level; by providing bridging programs in core skills such as literacy; and by ensuring that new entrants to the workforce have a strong base for future learning.

The increase in new qualifications gained by older adults in most of the benchmark countries is lifting national profiles. A strengthening of programs designed to meet the needs of adults already in the workforce is probably a prerequisite for competing at the post-compulsory level with countries like the U.S. or Germany. Pressures on entry level training in Australia have, until recently, led the Australian system to under-emphasise the older market. Recent growth in postgraduate activities and the use of the national skills framework to measure ongoing skill development have shifted the emphasis to some extent; nevertheless, the Profile Age Gap continues to grow in Australia. In addressing this problem, it is important to review the experience of other countries, particularly those with larger skill gaps and more effective competitiveness rankings than Australia.

The competitive opportunity for countries with large Profile Age Gaps is to address skill bridging, to ensure that older persons have the mix of ideas, operational skills, and learning skills to participate effectively with younger, more qualified, persons. The competitiveness opportunity for countries with low Profile Age Gaps combined with relatively high qualification stocks is to address retraining and skill updating.

Options for improvement

Australia needs to re-engineer the value chain which creates the national skill base: to shorten cycle time; to increase the focus on external competitiveness; to enhance links between

industries and the education and training system; and to establish the preconditions for successful programs of continuous improvement at all levels of the education and training system. Unless the focus shifts from supply-side perspectives to the demand-side of the workskill equation, cycle times are likely to lengthen rather than reduce, and competitors are likely to perform more effectively.

Unless the focus shifts from internal comparisons to external comparisons, those in education and training and industry seem unlikely to notice, until the present competitive advantage has been lost, that they have failed to adapt. Five key improvement strategies for Australia are suggested by this analysis.

(1) ***Match the future qualification growth of key competitors***

- Maintain growth to match competitors with more rapidly ageing populations and lower population growth.

(2) ***Develop an integrated qualification framework for Australia which can be applied to post-compulsory schooling programs, as well as to vocational programs***

- Review Australian qualification standards, first, to ensure that they are compatible with international as well as national standards, and second, to ensure that they emphasise competitiveness and workskill links, as well as traditional supply-side sector and institutional links.

- Align Australian standards with evolving international standards and with developing VET, school and university standards.

(3) ***Address two key strategic gaps between Australia and major competitors: the post-compulsory profile gap and the Profile Age Gap***

- Ensure that future qualifications growth addresses the growing gap at the post-compulsory end of the profile. This requires a mix of school and VET pathways which leads to higher level base qualifications than many young Australians appear to be gaining today.

- Review post-compulsory programs offered by the VET and school systems, to evaluate them against the ISCED Level 3 standard, and to ensure that they offer a sound basis in the three core areas of workvalue: ideas and concepts; operationalization of skills in the workplace; and the capacity for future learning. For some school programs, the operationalization test will present a challenge. For some of the very modular VET programs, the provision of a general skill base to support ongoing learning will also prove challenging. However, both the school and VET systems in Australia have addressed these issues in recent years. It is now important to assess what has been delivered.

- Examine strategies utilised by other countries to upgrade and reskill the existing workforce, and benchmark improvement strategies for Australia, to ensure that Australian education and training outcomes are competitive in this area of training reform.

(4) ***Improve the alignment of education and training and industry workskill priorities***

- Examine strategies utilised by other countries and industries to translate education and training reform into industry competitiveness, and identify and benchmark improvement strategies for Australia. Where necessary, re-engineer the education and training value chain to increase both flexibility and scope to add value to the national skill base.

(5) ***Use ongoing benchmarking and evaluation processes to implement effective continuous improvement strategies for education and training***

- Establish Benchmarking Teams with representatives from education and training and industries to evaluate annually trends in Australian qualification profiles and national competitiveness against trends in benchmark countries, and require Teams to report annually on required strategic actions.

- Measure gaps between new entrants and older members of the workforce, compare them to gaps in other countries, and report annually on required strategic actions.

- Conduct ongoing U.K.- style audits of standards, to benchmark Australian qualifications against those of selected countries, to ensure that Australian qualifications continue to match or exceed overseas standards.

- Conduct Pilot Benchmarking Projects focused on sectors (e.g. VET) or industries (e.g. Manufacturing Food). Use these Projects to assist education and training and industries to work together to add to the international competitiveness of Australian workskills and industries.

- Require Strategic Planning and Policy Proposals to include a competitiveness impact statement, which explores the impact on international competitiveness of Australian workskills. Ensure that the impact statements are themselves evaluated, and that industries and students are involved in the process.

SUMMARY

If Australia is to gain from external benchmarking, the process needs to focus both on the volume, quality and relevance of outcomes and on the processes used to align the priorities of the education and training system with industries' priorities and with improvements in national competitiveness.

Australia faces clear national priorities and a limited national resource base. Benchmarking needs to ask whether there are more effective strategies for addressing outcomes than the traditional planning, funding and evaluation systems that evolved to meet different needs.

The most effective way to address these issues is to move beyond the internal competition for status and resources which drives so much of the education and training debate, by examining in detail solutions utilised by other countries who are more competitive than Australia.

The most effective way to assist the education and training system to align priorities is to deregulate and decentralise the education and training system, to diversify funding sources, and to shorten cycle times.

Australia needs to re-engineer the value chain which creates the national skill base: to shorten cycle time; to increase the focus on external competitiveness; to enhance links between industries and the education and training system; and to establish the preconditions for successful programs of continuous improvement at all levels of the education and training system.

Five improvement strategies are suggested.

- Match the future qualification growth of key competitors.
- Develop an integrated qualification framework for Australia which can be applied to post-compulsory schooling programs, as well as to vocational programs.
- Address two key strategic gaps between Australia and major competitors: the post-compulsory profile gap, and the Profile Age Gap.
- Improve the alignment of education and training and industry workskill priorities.
- Use ongoing benchmarking and evaluation processes to implement effective continuous improvement strategies for education and training.

APPENDIX A: A COMMENT ON THE DEVELOPMENT OF COMPARATIVE QUALIFICATION FRAMEWORKS

The single most useful source of comparative data on outcomes of education and training systems between countries is the qualification stock data published each year by the OECD. These data are classified against the ISCED framework.

The analysis in this Report, of relationships between qualification stocks in each country and that country's competitiveness, also utilises the ISCED framework to differentiate between countries.

While the existing framework and the data base developed by the OECD support a range of important comparative studies between countries, the ISCED framework has experienced difficulty accommodating some aspects of recent education and training reforms, and it is currently under review. The changes already proposed to improve definitions and to add a new Level 4 will, if accepted, add value to the classification framework. However, current proposals appear to leave a number of difficult issues unresolved.

This Appendix discusses issues identified in this Report, which the review might usefully address.

Old assumptions about the classification of qualifications are becoming less useful

While there is a general correlation between qualification profiles and competitiveness, detailed comparisons of profiles between countries encounter a number of difficult categorisation problems. As Cosier points out, segmentation of qualifications works well enough within any one country's system, but it can be difficult to interpret across countries.[30]

There are three issues which any comparative qualifications framework must address.

- Post-compulsory schooling has developed differently in different countries. In Germany, for example, students are streamed into vocational paths at the upper secondary level. In the U.S., students complete secondary programs and then move into various vocational programs. As the proportion of the population completing secondary schooling has increased, the numbers completing school represent a wide range of different achievement levels. In seeking to compare these different systems, it is important not to force fit national data into frameworks which do not measure relative workskills and workvalue.

- The institution-based university - non university dichotomy often utilised to categorise tertiary education sectors is increasingly breaking down, as higher level vocational qualifications exceed the old university level standards, and as university degree standards shift in response to an expansion of university education, which has seen

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[30] Ian Cosier, "Is Higher Education Losing the Battle to Differentiate its Products from the Vocational Education and Training Sector and Increasingly Industry?" Paper presented to the European-American University Forum, "Bridging the Atlantic: Timeless Traditions and New Models of Higher Education." Lisborne, Portugal, November, 1996.

vocational areas, such as nursing and education, join the other professional vocational education and training in the university sector.

- Finally, links between education and training and the competitiveness of national and industry workskills must address both the skills gained in the workplace and the need for ongoing development and regular skill upgrades. Gaps between the skills of new and existing workers need to be effectively managed. Because systems are developing differently in different countries, some programs appear in measured qualification profiles, but other programs do not.

This analysis of links between qualification profiles and competitiveness suggests three options for improvement

Current revisions to the ISCED framework appear to focus on the introduction of an additional level between upper secondary and the current sub degree level. While this adjustment would simplify the classification of some programs, particularly in some countries, it can only commence the process of recognising the growing complexity of linkages and the gradual breakdown of traditional assumptions about hierarchy.

- **The need for improved definitions will reduce country anomalies and strengthen the data base**

  The need for improved definitions is clear. The need for such definitions to focus on outcomes, rather than traditional surrogates such as age and length of attendance, is also clear.

  There has been much discussion about the degree - sub-degree interface, driven by country differences and by the shift of professions (such as nursing and teaching) from sub-degree entry to degree entry, which has occurred in a number of countries over recent years. Differences in competitiveness correlations between post-secondary and degree probably reflect two factors: first, the timing of shifts between the post-secondary categories in different countries, for example, Australia simply reclassified all professional nurses as degree qualifications in 1994, the impact being an estimated 1.6% shift in the overall population profile; and second, decisions by countries about whether or not to convert high level technical diplomas to degree status.

  The post-compulsory (upper secondary) and post-secondary interface has also experienced problems, because some countries have expanded traditional post-compulsory-level-type qualifications but have classified them as post-secondary as they are increasingly commenced by students who have completed school programs. In addition, some trade qualifications have been significantly upgraded in recent years but have been contained by the framework in the post-compulsory group, when an evaluation of outcomes would probably have advanced them into the post-secondary level. The proposed Level 4 (a new level between upper secondary and non-degree post-secondary) may assist in clarifying some of these relationships.

- **The development of production models would benefit from additional segmentation between entry level qualifications and qualifications which are part of ongoing education and training. The latter can be expected to grow in**

importance

Perhaps the greatest single need is for some way to compare the impacts of retraining programs on the qualification stocks in different countries, and to separate these data in some way from new entrant training. Currently the only area where qualification frameworks capture significant retraining is the degree area, where postgraduate qualifications can be measured; any revised framework needs to address such activity below the degree level, and this is more difficult.

- **There may be scope to replace traditional educational hierarchies with performance-based or competitiveness-based hierarchies**

Comparative analysis by Performance Management Solutions has identified a clear relationship between rankings based on qualification profiles and rankings of competitiveness. Further, there is at least some evidence that the linkage with competitiveness is itself hierarchical. The relationship is surprisingly strong, and it also appears to apply, with a number of modifications, to developing countries.

In finalising a revised framework, there would be merit in examining this analysis and in considering whether links with competitiveness (which appear to be hierarchical but very different from the sorts of hierarchy that often drive education and training classifications) may be able to contribute new perspectives and whether they may add value to the review.

APPENDIX B: ALTERNATIVE AUSTRALIAN QUALIFICATION MEASURES

The OECD has published qualification profiles for Australia which show a decline between 1991 and 1994. This decline appears to have been caused by major changes in the survey categories used to collect these data, and by problems with the 1994 survey results which caused the Australian Bureau of Statistics (ABS) in 1996 to publish revised estimates for 1994. In order to measure real growth in Australian profiles and to compare it with growth in other OECD countries, it is necessary to produce comparable 1991 and 1994 profile measures for Australia. Appendix C discusses the Performance Management Solutions revision of OECD profile data for Australia.

In 1993, ABS introduced a revised qualifications framework which can be linked more directly to the ISCED framework because it provides more information on levels and types of non-degree qualifications. However, the new measures are different from the 1991 measures, which could not be adjusted retrospectively. In addition, as noted above, the published ABS data for 1994 were revised significantly in 1996. Finally, the assumptions which appear to have been made to apply the new ABS data to the ISCED framework appear to underestimate both the 'post-compulsory (upper secondary) and the degree (university) profile, and the data may benefit from further review.[31]

Three aspects of the changes introduced in 1993 appear to have had a major impact on the OECD Australian profile measures.

- First, the 1994 ABS data classify all professional nurses at degree level; previously only those with a degree qualification were included.

- Second, the 1994 data exclude some 6-7% of ABS non-degree post-secondary qualifications, on the grounds that they are short programs (less than one semester.) These qualifications were included in the 1991 ABS data, and many also appear to have been included in the 1991 OECD profile data.

- Third, the revised ABS classification framework introduced in 1993 identifies a major component of qualifications as 'basic vocational'. Australia, when applying the 1994 ABS data to the ISCED framework for submission to the OECD, appears to have excluded all 'basic vocational' qualifications. While these 'basic vocational' qualifications were not identified in the 1991 ABS data, many appear to have been included in the 1991 OECD profile.

In order to obtain a measure of real profile growth between 1991 and 1994 for Australia, Performance Management Solutions has produced revised estimates, which are detailed in *Exhibit B1: Australia: OECD and ABS Profile Data*.

Five adjustments are included in the revised estimates.

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[31] The OECD profiles can be derived from the published 1994 ABS data. The discussion in this Appendix assumes that this is what occurred.

- 1991 data are adjusted to remove the discontinuities discussed above.
- 1994 estimates use the revised ABS data for 1994.
- 15 % of basic qualifications are classified as post-compulsory.
- Associate Diplomas are divided between the post-compulsory and post-secondary levels, to reflect the range of qualifications in this group.
- Education diplomas are transferred to degree level.

EXHIBIT B1: AUSTRALIA: OECD AND ABS PROFILE DATA (Page 1 of 2)

	1991 adjusted 15-64	25-64		1994 adjusted 15-64	25-64		1994 initial 15-64	25-64		1996 15-64	25-64	
a Post-secondary	4662	4079.5		4570	3986.7		4548.2	3965.3		5091	4470.2	
b Degree	1027	901.45		1346	1206		1345.5	1206		1545	1391.1	
c Undergrad dip.				348	321.8		346.4	320.5		335	311.7	
d Diploma nurs. ed.				80	72		80	72		80	72	
e Other diploma				268	249.8		266	248.5		255	239.7	
f Associate diploma				659	572		637.4	555.3		728	622.1	
g Skilled vocational				1508	1311.4		1349.8	1190.8		1701	1515.1	
h Completed year 12	1962	1215.08		2080	1250.2		2086.8	1257		2124	1272.8	
i Basic vocational (>1sem.)				707	530		865.5	689		783	630.2	
j Basic vocational (<1sem.)												
k All other	2191	1889.72										
l Total employment	11440	8741.4		11726	9027.1		11725.6	9027.1		12042	9371.3	
OECD data	**56.0**	**31.0**	**10.0**				**50.2**	**23.1**	**13.4**			
Growth 1991-1994							*-5.8*	*-7.9*	*3.4*			
PMS replication of OECD da	**60.6**	**31.9**	**10.3**	**52.1**	**23.3**	**13.4**	**50.2**	**23.1**	**13.4**	**54.6**	**24.8**	**14.8**
PMS revised estimate	**48.5**	**18.1**	**12.4**	**53.0**	**20.1**	**14.2**				**55.6**	**21.5**	**15.6**
Growth 94-946				*4.5*	*2.0*	*1.8*				*2.5*	*1.4*	*1.5*
Country ranking												
- OECD	**11**	**3**	**9.5**				**15**	**5**	**7**			
- PMS revised profile	**14**	**11**	**4.5**	**15**	**11**	**5**						

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The PMS revised estimate for 1994 assumes that 15% of 'basic vocational' qualifications are held by persons who have reached at least OECD Level 3. If all such persons are assumed to have reached Level 3 the post-compulsory profile increases to 58%. While it is unlikely that any audit of these qualifications would allocate them all to Level 3, the figure represents an upper limit to possible adjustments to the Australian profile.

r2gexb1

PMS REPLICATION OF OECD PUBLISHED PROFILES

1991

Post-compulsory	(a+h)/l x 100
Post-secondary	(b+k)/l x 100
Degree	b/l X 100

Assumes that post-compulsory is all ABS 'post-secondary' plus ABS 'Year 12.'
Assumes that ABS 'trade' qualifications are post-compulsory but not post-secondary
Assumes that all ABS 'certificate or diploma' and ABS 'Other' are post-secondary
Assumes that ABS nursing and education 'diplomas' are post-secondary but not degree.

1994 and 1996

Post-compulsory	(a+h-i-j)/l x 100
Post-secondary	(b+c+f)/l x 100
Degree	(b+d)/l X 100

Assumes that post-compulsory is all ABS 'post-secondary' plus ABS 'Year 12.'
Assumes that ABS 'basic vocational' qualifications are excluded from post-compulsory.
Assumes that ABS 'basic vocational' and ABS 'skilled vocational' qualifications are excluded from post-secondary.
Assumes ABS non degree nursing and education 'diplomas' are post-secondary but not degree.

PMS REVISION OF OECD PUBLISHED PROFILES

1991, 1994 and 1996

Post-compulsory	(a+h-i-j)/l x 100
Post-secondary	(b+c+0.5xf)/l x 100
Degree	b/l X 100

Assumes that post-compulsory is all ABS 'post-secondary' plus ABS 'Year 12.'
Assumes that 85% of ABS 'basic vocational' qualifications are excluded from post-compulsory.
Assumes that ABS 'basic vocational' and ABS 'skilled vocational' qualifications are excluded from post-secondary.
Assumes that 50% of ABS 'associate diplomas' are classified as post-secondary and that the balance is post-compulsory.
Assumes that ABS education 'diplomas' are degree level qualifications. (Nursing non-degree qualifications are included in the 1994 ABS data.)

For 1991, (d) (i) (j) (f) are estimated from 1994 profiles.

APPENDIX C: MEASURING THE RELATIONSHIP BETWEEN QUALIFICATION STOCKS AND NATIONAL COMPETITIVENESS

PURPOSE

To discuss the measurement of the relationship between qualification stocks and competitiveness across OECD countries.

BACKGROUND

Many leaders, in both government and education, have long held that there is some form of relationship between national competitiveness and education. The recent U.K. Skills Audit stated "It has not been the purpose of this Audit to explore how skill levels are related to competitiveness; we have taken that as given."[32] The statement relies on a production theory which links qualifications through workskills and productivity to production growth and growth to competitiveness.

While links between upper secondary qualifications and productivity have been identified and analysed, links with higher level qualifications have proved more difficult to identify.[33] A number of analysts report that they have searched for such a relationship unsuccessfully. Where they have found relationships, the results have tended to be weak and volatile over time.

It is important to recognise that, while there may be relationships between educational attainment and national productivity, there can be no such direct relationship with national competitiveness. Competitiveness by definition ranks countries. If there is a relationship between qualification stocks and competitiveness, it is likely to be between country rankings, rather than absolute measures of profile stocks.

Three assumptions about the links between qualification stocks and competitiveness have been used to guide the specific methodology developed for this Report.

- The first assumption is that qualification profiles impact on competitiveness through their capacity to differentiate between or rank countries.

- The second assumption is that the differentiation between countries with a wide range of competitiveness and development is likely to be hierarchical, with low competitiveness countries with low levels of qualifications being differentiated on the basis of post-compulsory profiles, and high competitiveness countries with high levels

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[32] The Skills Audit: A Report from an Interdepartmental Group. Chapter 1, page 1. Summary.

[33] See U.S. Department of Education. National Center for Education Statistics. *Education and the Economy: An Indicators Report*, NCES 97-269, by Paul Decker, Jennifer King Rice, and Mary T. Moore. Mary R. Rollefson, Project Officer. Washington, DC: 1997, page 82. for a discussion of research into the links between productivity and educational attainment which concludes that, while there is evidence that differences in the rate of secondary education can be related to differences in worker productivity between countries, there is less evidence of a link with higher level profiles.

of post-compulsory qualifications likely to be differentiated on the basis of post-secondary and degree profiles.

- The third assumption is that differences identified from a general analysis across a broad range of countries can identify trend variables which will apply to a single country over time. This is the most difficult assumption to test because of difficulties with time based data, and because of the impact of other factors which impact on country competitiveness.

Given the strength of the broad relationships between qualification stocks at all levels and national competitiveness identified in this Report, it is important to review the approach adopted, to consider why alternative methodologies may have failed to identify this relationship, and to test the limitations of the analysis.

METHODOLOGY

The country sample included all countries reporting qualification profiles in the 1996 edition of Education at a Glance - OECD Indicators.

Countries were ranked on the basis of rankings in The World Competitiveness Yearbook 1997.

The same countries were ranked on the basis of qualification profile measures (the proportion of the Age 25-64 population with each group of qualifications.)

The qualification groups used for the analysis were based on the ISCED levels. Profiles were converted from 'highest' qualification measures to 'lowest' qualification measures. The three levels were post-compulsory (and above,) post-secondary (and above) and degree (and above.)

The two sets of country rankings were converted into an index (1-100) and both regression analysis and rank correlations were used to explore relationships between the competitiveness and profile rankings.

A Qualification Profile-Competitiveness Index was developed by weighting each of the three qualification profile indices, and by setting the ranks of all countries equal for the upper quartile of each rank. Multiple regression analysis was used to explore initial weightings. The weightings used are 0.46 for post-compulsory, 0.37 for post-secondary, and 0.06 for degree, plus a fixed factor of 5.6%. The correlation with the competitiveness ranking of countries was 61% (rank correlation = 80%.) Several alternative approaches to the development of this Index were explored, and they delivered similar correlations. The weightings do not represent measures of the relative relationships between profile groups, since the post-compulsory index, for example, includes both the post-secondary and degree profiles. The rankings do, however, examine the additional differentiation delivered by post-secondary qualifications, in addition to their role within the post-compulsory index. The Index does provide an improved explanation of competitiveness differences between countries, and it also provides a method of aggregating the impact of the three profile measures for comparisons between countries (and regions.)

DISCUSSION

The use of lowest, rather than highest, qualification categories is essential when measuring the relationships with competitiveness, for all levels except degrees.

Comparison of qualification stocks needs to focus on workforce or on working age profiles (% of persons with the qualification.) The OECD publishes profiles for the Age 25-64 population in each country, which can be used as a basis for such comparisons.

While the OECD reports 'highest' qualification levels, they are residual measures for all levels except degree and over, which is really a lowest qualification definition.[34] Analysis which focuses on 'highest' qualification data, such as that published by the OECD, is limited for the upper secondary and non-degree post-secondary qualifications groupings, because they are partial categories. For example, to explore the relationship between those completing upper secondary qualifications and competitiveness, it is necessary to include all such persons, not just those who do not obtain a subsequent higher qualification.

The situation for non-degree post-secondary is complicated by classification transition between these groups, for example, degree level is now required for entry to the education and nursing professions in a number of countries, and various assumptions appear to have been made to measure residual stocks of older qualified persons in these professions.

The use of ranking rather than absolute measures reflects the nature of competitiveness.

The above U.K. Skills Audit statement illustrates a major problem which must be addressed when exploring the relationship. At one level, the statement correctly asserts that increases in productivity are a prerequisite for increases in competitiveness. However, at another level, the statement is dangerous, because it could lead a nation to believe that competitiveness is too easily achieved.

Most countries are improving productivity and qualification stocks. By definition, some of them are becoming more competitive and others are becoming less competitive. Worksksills or qualifications cannot be expected to relate to competitiveness unless they, too, are used to differentiate between countries.

In this analysis, the use of qualification profiles to rank countries develops a measure which can properly be compared to competitiveness rankings over time. Although similar results can be obtained for any one year using the raw profile measures, the relationships cannot by definition hold over time, as they predict growth in competitiveness for all.

A number of attempts to explore the qualification - competitiveness relationship appear to have focused on country production models, which cannot usefully explore the relationship with competitiveness unless they are also applied to all countries to explore the impact on ranking.

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[34] The degree and above level is often seen as a highest qualification categorisation; in fact, it is a lowest qualification classification. Analysis of highest qualification categories is really measuring two residual groups, plus one lowest qualification category 'degree and above'.

Difficulties are implicit in statistical analysis of ranked data.

While the analytical model discussed above requires the conversion of profile data to country rankings, the use of rankings presents two difficulties for evaluation and analysis.

The most significant difficulty is that ranking data alters the distribution and can distort relationship measures derived from regression techniques. However, where one set of data is ranked and the other set is available in absolute form, attempts to relate them without ranking both sets of data is also likely distort underlying relationships. Whether the use of ranking creates problems for analysis depends upon the distribution of the raw scores and this can be tested by running the regression on both sets of data. *Exhibit C1: Relationship Measures Using Ranked and Absolute Profile Data.*

Exhibit C1: Relationship Measures Using Ranked and Absolute Profile Data

	Square of the regression correlation coefficient (r2)	
	Ranked data	Absolute profile measures
Post-compulsory	0.50	0.52
Post-secondary	0.47	0.36
Degree	0.32	0.37

Exhibit C1 identifies few significant impediments to the use of the ranking methodology with these data.

The analysis uses regression techniques to explore relationships between rank indices. These fit a linear relationship to the ranks, and provide a measure which compares relationships. At the very least, these techniques fit a line to these data using the method of least squares.

The fact that both sets of data are rank indices complicates some aspect of the interpretation of the regression relationships. However, rank correlation measures are also used to measure the strength of the relationships between these data.

The square of the regression correlation coefficient provides a measure of the proportion of the total variance between competitiveness rankings explained by the regression line.

Two relationships apply where regression analysis is applied to two sets of ranked data: the Spearmen rank correlation coefficient is equal to the regression correlation coefficient; and the slope of the regression line is equal to the regression coefficient.

While tests which require assumptions about the distribution of likely results about the regression line must be used with caution, tests for the significance of the Spearman correlation coefficient are easier to apply. Most of the relationships identified are strong, and can be verified using a number of different measures.

The use of multiple regression analysis to explore the relative impact of rank variables.

The relative contribution of each profile was explored using multiple (and stepwise) regression on both lowest and highest qualification rankings.

The use of multiple regression analysis on interrelated data presents particular problems of interpretation. *Exhibit C2: Multiple Regression Analysis* summarises the results.

Exhibit C2: Multiple Regression Analysis

LOWEST QUALIFICATIONS	Multiple regression results	
	Slope	r2
(All) Post-compulsory	0.46	0.61
(All) Post-secondary	0.37	
(All) Degree	0.06	
Fixed	5.6	
HIGHEST QUALIFICATIONS		
Post-compulsory less all post-secondary	0.46	0.59
Post-secondary less all degree	0.20	
Degree	0.40	
Fixed	-3.4	

The multiple regression using lowest qualification rankings summarised in Exhibit C2 suggests that the correlation between competitiveness rankings and post-secondary and degree rankings cannot be explained in terms of the lower level post-compulsory qualifications required for entry to post-secondary and degree programs. The weighting for degrees does not represent a measure of the relative impact on competitiveness, because degree qualifications are also contained in the other two variables.

Results of multiple regression analysis using highest qualification profile rankings are also presented in Exhibit C2. While the degree profile remains the same for both analyses, the post-secondary profile contains only that part of the post-secondary profile without a degree, and, the post-compulsory profile contains only that part of the post-compulsory profile that does not also possess a higher level qualification. The multiple regression using highest qualification rankings in Exhibit C2 suggests that the correlation between competitiveness rankings and post-compulsory rankings cannot be explained in terms of the proportions of persons also gaining post-secondary and degree level qualifications. The high weighting for the partial post-compulsory ranking, combined with the result for the lowest qualification rankings discussed above, confirms the importance of post-compulsory profile rankings in explaining variations in competitiveness between countries.

Two conclusions are suggested by this analysis: first, that the all post-compulsory level has the strongest overall relationship with country competitiveness; and second, that degrees and post-secondary qualifications add further value to national competitiveness.

The use of macro analysis across countries reflects the objective of identifying general rather than country-specific relationships.

Focusing on a macro analysis across all countries, and then exploring the application of general relationships to specific country situations is more likely to overcome the impact of other variables, than is the alternative approach of identifying country-specific relationships and then seeking to generalise.

However, in seeking to apply such relationships to a specific country, issues involved in particularising the relationships need to be considered, for example: the effect of other competitiveness factors; the impact of timing; and the effectiveness of the specific processes which create workskills in each country.

Initial analysis, which removes countries with large shifts in both profile and competitiveness on the grounds that they are unlikely to reflect underlying qualification competitiveness links, identifies a positive correlation between shifts in competitiveness rankings and shifts in profile rankings. However, a further examination of selected countries is required to refine this approach.

The focus on country differentiation suggests a hierarchical differentiation process for qualifications as they impact on competitiveness.

Weighting derived from multiple regressions and the negative correlations identified between profile growth and competitiveness both suggest a hierarchical model for country differentiation.

The model proposes that countries first differentiate on the basis of post-compulsory profiles, then on the basis of post-secondary, and then on the basis of degree profiles. This approach can be extended to include other profile elements, such as compulsory schooling and postgraduate qualifications, and to shift differentiation by introducing saturation levels for each profile.

The concept of hierarchical differentiation appears to add value to general profile analysis for both developing countries, where a strong school system may be critical to competitiveness, and for highly developed countries, where a strong university and postgraduate system may be critical.

The analysis assumes that qualifications are an input to the competitiveness process rather than a result of it.

Causation is often a difficult issue for this type of correlation-driven analysis. However, both developing country case studies and a general study of profile growth across countries suggest that qualifications are an input to competitiveness.

The analysis assumes that qualifications are an indicator of the workskills which are developed

when a person with qualifications enters employment and develops more specific skills. Some comparisons seek to measure the skills gained in obtaining a particular qualification. While both ideas are useful, they represent different uses of qualification measures.

Links between qualifications and workskills are complex, and appear to be more effective in some countries' education and training systems than in others. When qualifications are used as a measure of workskills, they are also assumed to measure associated training, much of which does not lead to a formal qualification. This may explain the relative importance of general, as well as vocational, qualifications suggested by this analysis. A number of issues add to an understanding of these differences between countries.

- The extent to which there is a targeting of qualifications towards those offering the highest potential to industry.

- The basic quality of the skills delivered by particular qualifications in particular countries, and the extent to which they provide a basis both for the development of operational skills and for ongoing learning.

- The effectiveness of on-the-job and off-the-job training provided by employers to enable employees to deliver workvalue.

- The extent to which the education and training system in a country is able to work with industries and individuals to renew and adapt initial skills over time.

The implications of these results for country-specific education and training strategies seem to be important and to require further exploration.

While the country ranking factors discussed above are undoubtedly one source of variability which can be removed from the analysis, other variables remain and are more difficult to isolate.

Analysis suggests that countries seeking to become more competitive, or to maintain existing competitiveness, need to examine qualification stocks and projections of future stocks. However, to increase competitiveness, countries need to increase their ranking. While the impact of a particular country's profile growth on profile ranking can be estimated by comparison with the average growth rate, the actual test is growth in excess of the average growth rate.

Where rankings differ significantly over the three profiles, the impact on competitiveness needs to be explored. Rankings which weaken as the level increases may support a development strategy. However, where the post-compulsory ranking is high, such countries need to develop higher level qualification stocks and ranking. Rankings which strengthen with level represent a competitiveness block for any country seeking to develop competitiveness on the basis of workskills. The priority needs to be to create competitive post-compulsory skills. While higher level qualification stocks are a source of competitive advantage, the analysis suggests that a prerequisite for deriving this advantage is a competitive post-compulsory profile.

Where skill gaps are identified in a particular country from an examination of profile ranking, the first requirement is to test that country's data for both competitiveness and qualification

profiles, to ensure that the gaps are real. If they seem real and there appear to be competitiveness benefits from closing them, it is then important to target growth towards programs and qualifications that appear to offer valid links with competitiveness, rather than simply to seek macro growth.

The ranking methodology needs to be adapted to facilitate its use as a planning variable.

The ranking methodology presents difficulties for growth projections. Ideally, each country needs to be projected in order to explore shifts in ranking. However, three simplifications can be used.

- First, the average OECD growth rates for each group can be used as a control over country profile growth. Where a country exceeds the average, it is likely to increase its ranking over time.

- Second, approximate rank shifts can be projected, using average growth rates and average rank conversion rates.

- Third, where actual growth rates are not available, Profile Age Gaps can be used as an approximation.

CONCLUSION

There is a strong correlation between the ranking of OECD countries on the basis of qualification profiles and competitiveness. In addition, a competitive post-compulsory qualification ranking appears to be a prerequisite for deriving the full competitiveness benefits from higher level qualification stocks.

Although particularisation of this analysis to the situation of a specific country involves a consideration of other variables, the relationship between qualification profiles and competitiveness, combined with more specific targeting, offers scope for a country to review and optimise the competitiveness benefits from education and training reform.

The reasons why some alternative methodologies appear to have either failed to identify relationships, or to have found relationships that proved to be unstable over time, merit further investigation. This analysis suggests that there is value in pursuing some of the attempts to develop production and human capital models further. However, if they are to add to an understanding of links between education and training outcomes and country competitiveness, such developments also need to address country ranking issues.